FLOOD PLAIN INFORMATION

GRAND RIVER

TRUMBULL COUNTY OHIO

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PREPARED FOR
OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF PLANNING, FLOOD PLAIN MANAGEMENT SECTION
AND THE TRUMBULL COUNTY PLANNING COMMISSION

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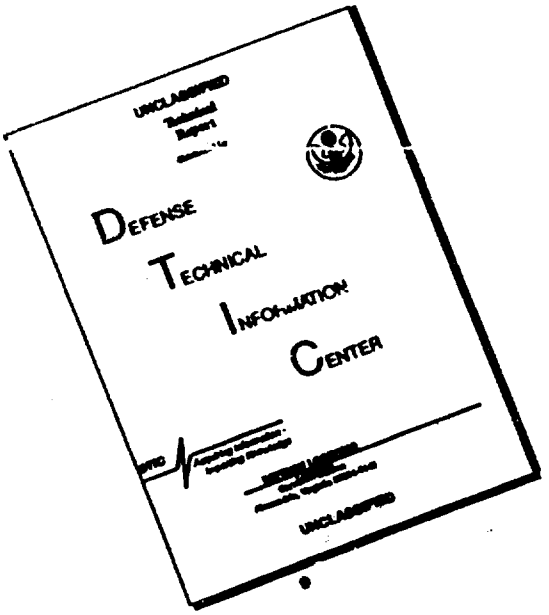

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The purpose of this study is to collect and develop information on past and probable future floods associated with abnormal water flows. This report is based on hydrological facts, newspapers accounts, and photographs of recent floods, and technical data having a bearing on the occurrence and magnitude of floods within the study area. This report covers 23.6 miles of river and flood plain area along Grand River from the northern Trumbull County line to the Western Trumbull County line. Within the study reach,

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the river flows through Farmington, Mesopotamia, and Bloomfield Townships to the Village of West Farmington. The flood plain of the Grand River also extends into Bristol township.

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INTRODUCTION

Flood plains exist primarily to temporarily convey and store flood flows which periodically exceed the capacity of natural or man-made watercourses. They have also been an inviting but not always profitable or wise attraction for development by man. Advantages of waterborne transportation and commerce led to early settlement along the river networks and the strong aesthetic attraction water holds for man has further encouraged encroachment into flood prone areas.

Where such development has occurred, floods threaten life, health, and property and disrupt business among its other impacts on man's environment. An obvious solution to this problem is to exercise greater wisdom in the use of flood plains. However, such wisdom cannot be exercised unless there is adequate knowledge of the flood hazard potential and a will on the part of the users of flood plains to plan with the hazard in mind. Regulatory powers to affect sound land use in flood prone areas have not been used extensively until recent years. Since flood plains are attractive development sites, flood plain management practices cannot of themselves eliminate flood damages. However, flood plain management practices can certainly reduce damages and should be given greater consideration by both planners and local governments. Consequently, the Flood Plain Management Services Program was developed within the Corps of Engineers to provide local governments with a better understanding of their flood problems and their effect on future growth and development. The program, through flood plain information reports, provides flood hazard information that may be used to develop land use regulations for guiding community growth.

This flood plain information report is for the Grand River, beginning at the northern Trumbull County line and extending upstream to the western Trumbull County line. It has been prepared at the request of the Flood Plain Management Section of the Division of Planning of the State of Ohio Department of Natural Resources and the Trumbull County Planning Commission and will be distributed to local interests through these agencies.

The purpose of this study is to collect and develop information on past and probable future floods associated with abnormal water flows. This information is for use by local authorities in further study, planning, and action in eliminating or reducing flood hazards and in avoiding or reducing future damages likely to be associated with the development or utilization of flood plain areas. With this data, future development of such areas may be planned at elevations high enough to avoid flood damages or at lower elevations with recognition of the chance or hazards of flooding that exist.

This report is based on hydrological facts, newspaper accounts and photographs of recent floods, and technical data having a bearing on the occurrence and magnitude of floods within the study area.

Included in this report are maps, profiles, photographs, and cross sections which indicate the extent of flooding that might occur in the future. If properly used, this information can be very beneficial in wise flood plain management. The maps, profiles, and cross sections indicate the depth of probable flooding at any location which would result from the occurrence of either the Intermediate Regional Flood or the Standard Project Flood.

The report does not include plans for solutions of flood problems but provides the basis for further study and planning on the part of the local governments to arrive at solutions which will minimize future flood damages. This can be accomplished by local planning programs which guide essential development by controlling the type of land use in the flood plain through zoning, building codes, health regulations, and other regulatory methods. Pamphlets and guides pertaining to flood plain regulations, flood proofing, and other related actions have been prepared by the Corps of Engineers. They are available, upon request, to State agencies, local governments, and citizens for planning and action to reduce flood damage potential.

The Buffalo District of the Corps of Engineers will, upon request, provide technical assistance to Federal, State, and local agencies in the interpretation and use of the information contained within this report and will provide other available related flood data. Requests for technical assistance should be coordinated through the Ohio Department of Natural Resources, Division of Planning, Flood Plain Management Section, Fountain Square, Columbus, Ohio 43224.

SUMMARY OF FLOOD SITUATION

This report covers 23.6 miles of river and flood plain area along Grand River from the northern Trumbull County line to the western Trumbull County line. Within the study reach, the river flows through Farmington, Mesopotamia, and Bloomfield Townships and the Village of West Farmington. The flood plain of the Grand River also extends into Bristol Township.

Past Flood Occurrences - There are no stream gaging stations or official records of past floods on this reach of the Grand River. Newspaper files and interviews with local officials were the only source of information on past floods.

From studies of possible future floods, the flood situation along the study reach has been developed and is summarized in the following paragraphs.

Intermediate Regional Flood (IRF) - The Intermediate Regional Flood is a flood that has an average frequency of occurrence in the order of once in 100 years. It is the minimum flood recommended by the Ohio Department of Natural Resources to define the regulatory flood plain.

Standard Project Flood (SPF) - The Standard Project Flood is a flood by the most severe combination of meteorological and hydrological conditions that is considered *reasonably* characteristic of the drainage basin under study. The elevations obtained from a flood of this magnitude are considered by the Corps of Engineers to be the upper limit of the flood plain.

Flood Damages - Within the study reach, little development has taken place. This is, of course, the proper time to identify flood prone areas and establish local regulations to prevent unwise use and development from encroaching into the flood plain, thereby increasing the flood damage potential. It is the purpose of this report to provide local officials with the needed flood elevations and flood area maps so that they can proceed with adopting flood plain regulations. An occurrence of the Intermediate Regional Flood or Standard Project Flood in the study reach would cause damage to any development within the flooded area because of the depth of flooding and accompanying higher velocities.

Main Flood Season - Normally major floods occur during the winter and spring months as a result of melting snow accompanied by moderate amounts of rainfall. However, it is possible for flooding to occur in any month of the year. Summer and fall floods usually result from intense local thunderstorms.

Flood Damage Prevention Measures - There are no existing or authorized flood control projects within the study area.

Possible Flood Heights - Flood levels that would be reached by the Intermediate Regional and Standard Project Floods are shown on Table 2 in the text. The table gives a comparison of these flood levels with bridge floor, average underclearance, and stream bed elevations at the ten bridge crossings. The water surface profiles for the Intermediate Regional Flood and the Standard Project Flood are shown on Plates 9, 10, and 11 and the flooded area on Plates 3 through 8.

Velocities of Water - During an Intermediate Regional or Standard Project Flood, average channel velocities would vary from 2.9 to 9.3 feet per second. Velocities greater than 3 feet per second, combined with depths of 3 feet or greater are generally considered hazardous and dangerous to life and property.

Hazardous Conditions - Larger floods can cause hazards to local residents in many ways. Since most floods occur in the late winter and/or early spring, residents experiencing flooding may suffer discomfort from lack of heat for a number of days due to basement flooding which extinguishes furnace fires. Health problems can develop when septic tanks are inundated and high water backs up through the sewer lines into basements. Municipal sewage treatment plants are often taxed beyond their capacities. Untreated discharge to floodways is made with consequent deposition of waste materials on stream banks and surrounding grounds. Flood waters which overtop roads can cause hazardous driving conditions. The danger from underestimating the velocity and depth of flood waters by unsuspecting children is an age old problem confronting residents within flooded areas.

GENERAL CONDITIONS AND PAST FLOODS

Description of the Area

Physical Setting - The Grand River originates west of Trumbull County and traverses Farmington Township in a northeasterly direction. The river then turns north and meanders between Bloomfield and Mesopotamia Townships until it flows out of the county at the downstream study limit. The reach of the Grand River examined in this report is shown in relation to the entire drainage basin on Plate 1.

Over its total length of 98.5 miles, the Grand River rises 544 feet from an elevation of 573 feet above mean sea level at its mouth at Lake Erie to 1,117 feet at its source for an average overall gradient of 5.5 feet per mile. Within the study reach, the rise is 69 feet as shown on Plates 9, 10, and 11 for an average gradient of 2.9 feet per mile.

The Grand River drains a total of 705 square miles. At the upstream and downstream study limit the drainage areas are about 10 and 203 square miles, respectively. The drainage areas of the Grand River and major tributaries are shown in Table 1.

Settlement - Trumbull County was organized in 1800. That same year, Mesopotamia Township was settled. A few years later, in 1804 and 1806, respectively, Bristol and Farmington Townships were settled. In 1815, the first settlers arrived in Bloomfield Township. The Grand River is mentioned, although not predominantly, in the early history of these townships. The early settlers of Bristol had hoped to make use of the Grand River as a means of transportation. The stream, however, was too shallow and full of underbrush and logs for this purpose. At certain times of the year, the flow was sufficient for emigrants to paddle up as far as Mesopotamia Township. The Bloomfield swamps, in Bloomfield Township, provided the early settlers with an abundance of wild berries and were the nesting place for a great number of pigeons. Although partially drained, some of the area is still swampy as shown on Plate 3.

Development - Since their settlement, population growth of the four townships has been slow but steady. The rate of growth has been less than that for the total county. In 1920, the population in the four townships accounted for 4.2 percent of Trumbull County. Most of the subsequent growth and development in the county has taken place outside of the Grand River basin and as of 1970 these four townships accounted for only 2.8 percent of the county population. As of the 1970 census, the populations of Mesopotamia, Bloomfield, Farmington, and Bristol Townships were 1,496; 1,144; 1,499; and 2,404, respectively. Included in the 1970 population for Farmington Township is 650 people within the Village of West Farmington.

TABLE 1

DRAINAGE AREAS WITHIN THE GRAND RIVER BASIN

Location	Distance Upstream From Mouth, Miles	Drainage Area, Square Miles	
		Tributary	Main Stem
Main Stem at Mouth	0		705
Phelps Creek	73.6	29.2	199
Main Stem Above Phelps Creek			170
Mill Creek	76.6	11.6	168
Main Stem Above Mill Creek			157
Swine Creek	77.0	30.9	157
Main Stem Above Swine Creek			126
Baughman Creek	82.5	18.7	107
Main Stem Above Baughman Creek			88.3
Center Creek	85.5	13.8	85.4
Main Stem Above Center Creek			71.6
Mud Run Creek	86.8	13.5	70.8
Main Stem Above Mud Run Creek			57.3
Dead Branch Creek	87.6	24	57.2
Main Stem Above Dead Branch Creek			33.2

The area is predominantly rural in character and agriculture is the main activity in the valley. Nearly all of the immediately adjacent flood plains are heavily wooded with the farmlands located farther away from the river. The 1990 Generalized Land Use Plan for Trumbull County shows this area to remain much as it is today with the exception of some additional residential development in West Farmington and Mesopotamia.

Factors Affecting Floods and Flood Damages

Channel Conditions and Development - The channel, banks, and immediate overbanks of the Grand River are similar throughout most of the study reach. The channel itself resembles a snake writhing back and forth across the flood plain as shown on Plate 2. River banks and immediate overbank areas are heavily wooded with only a few clearings near road crossings. Typical conditions along the banks are shown on Figures 1 and 2. The flood plain areas farther away from the river are more varied in that they are either wooded or used for agricultural purposes. Figures 3 and 4 show the distinction between the wooded areas and farmlands.

Obstructions to Flood Flow - Inadequate waterway openings under bridges, and encroachments such as fills in channel and overbank areas are major obstructions to passage of flood flows. Other serious obstructions are bends and irregularities of the channel, heavy brush, weeds, and trees on the channel banks and overbank areas and growth and debris extending into the channel.

Along the study reach, there is little encroachment by man other than for highway crossings. Natural obstructions, such as dense growth and trees along the banks and overbank are present as indicated on Figures 1 and 2.

There are ten bridges which cross the Grand River within the study limits. Figures 5 through 8 show some of the bridges and their waterway openings. Table 2 compares elevations of the bridges with the Intermediate Regional and Standard Project Flood elevations. If, during either the IRF or SPF, bridge openings become clogged with brush and fallen trees, then such obstructions would cause higher flood elevations upstream than normally would have occurred.

Obstructions such as dense growth, debris, and fallen trees in the stream channel can be minimized by local channel maintenance and cleanup programs. A concentrated effort by local residents should be made to prevent throwing of refuse or litter into the stream or along the banks. Additionally, the local governments should establish a floodway, which is the overbank area and stream channel reasonably required to convey the 100-year frequency flood. The floodway should be kept free of obstructions that interfere with flows and increase flood heights. Floods have occurred in the past and they will undoubtedly occur again. A floodway provides room for flood flows when they come.

Flood Warning and Forecasting Services - Presently there are no specific flood warning or forecasting services for the Grand River in Trumbull County. However, the study area is well within the effective range of the Weather Surveillance Radar operated continuously by the National Weather Service at the Cleveland and Akron-Canton Airport Stations. Weather service equipment provides for early detection of a storm and makes possible immediate radio and television broadcasts of information concerning the predicted storm path and amount of rainfall.

Existing Regulations - In Ohio, the legal authority to adopt and enforce zoning regulations is delegated to political subdivisions. The enabling statutes are within Chapters 303, 519, and 713 of the Ohio Revised Code. None of the political subdivisions within the study area have such regulations in effect.

Section 1521.14 of the Ohio Revised Code requires all departments and agencies of the State to notify and furnish to the Division of Water information on State facilities which may be affected by flooding. This information is required in order to avoid the uneconomical, hazardous, or unnecessary use of flood plains in connection with State facilities. The amendment further requires that where economically feasible, departments and agencies of the State and political subdivisions responsible for existing publicly owned facilities, provide flood proofing measures in order to reduce potential flood damage. Through a reorganization of the Ohio Department of Natural Resources, the Division of Planning was created which, through its Flood Plain Management Section, is now responsible for implementing this section of the Ohio Revised Code.

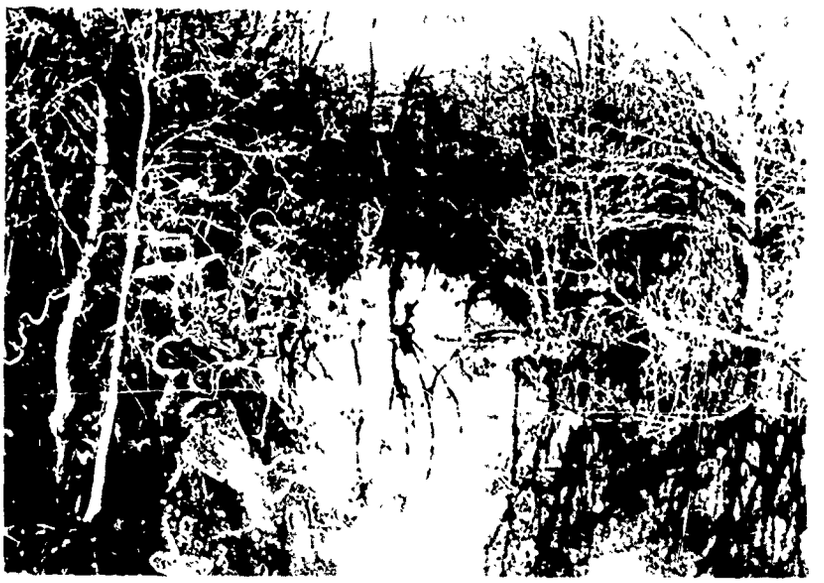


Figure 1—View of channel and banks looking downstream from State Route 87 bridge, at river mile 80.03.

Figure 2—View of channel and banks looking upstream from Hoffman Norton Road, at river mile 85.51.

Channel Conditions in Trumbull County
Photos Taken October, 1974

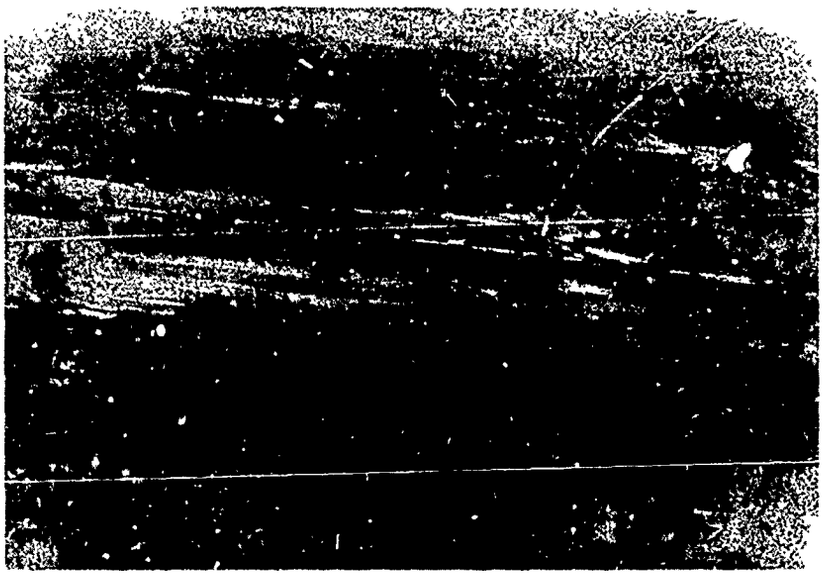


Figure 3—View of agricultural and wooded flood plain areas above State Route 87, near river mile 80.50.

Figure 4—View of agricultural and wooded flood plain areas below the Baltimore and Ohio Railroad, near river mile 90.70.

Flood Plains in Trumbull County
Photos Taken February, 1975

Figure 5—View of upstream face of State Route 87 bridge, looking downstream, at river mile 80.03

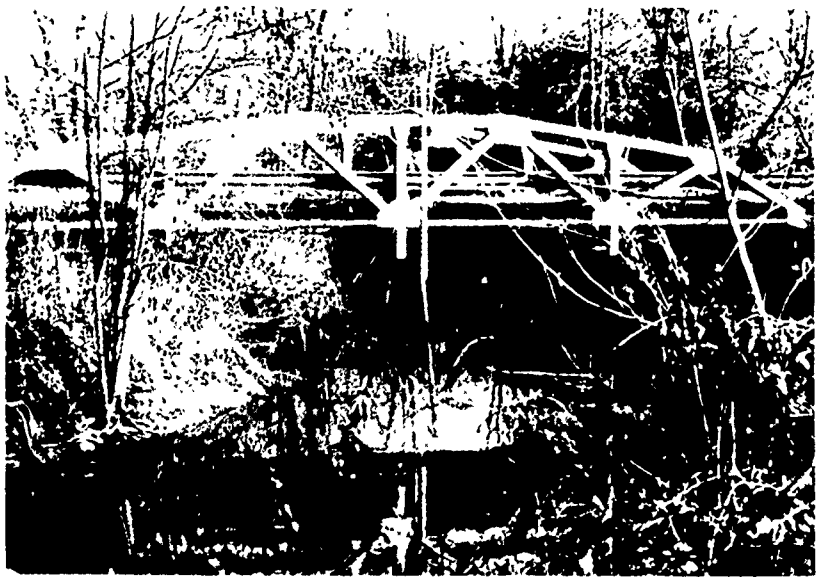


Figure 6—View of upstream face of Hoffman Norton Road bridge, looking downstream, at river mile 85.51.

Highway Bridges
Photos Taken October, 1974

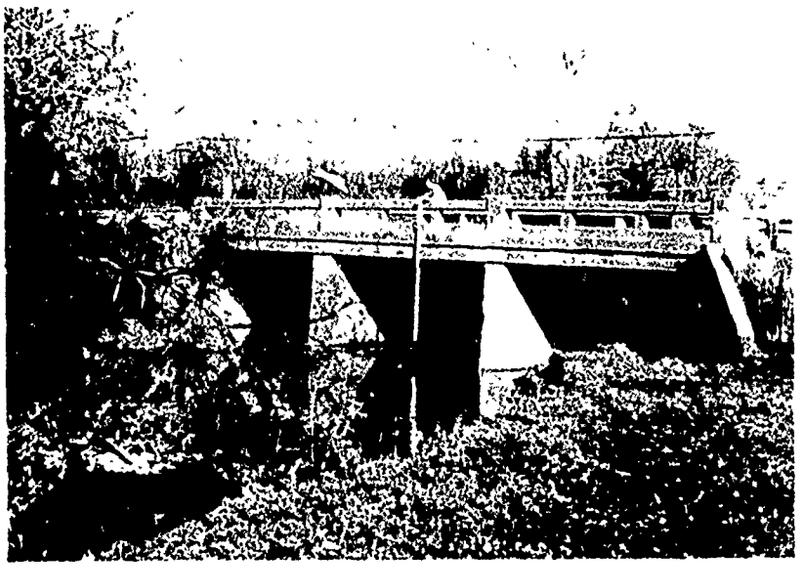


Figure 7—View of upstream face of State Route 534 bridge, looking downstream, at river mile 90.17.

Figure 8—View of downstream face of Baltimore & Ohio Railroad bridge, looking upstream, at river mile 90.98.

Highway Bridge
Photos Taken October, 1974

TABLE 2

BRIDGES ACROSS THE GRAND RIVER

Distance Upstream From Mouth, Miles	Bridge Identification	Elevations in Feet (U.S.C. & G.S. Datum of 1929) Approximate Stream Bed	Approximate Low Steel	Approximate Bridge Floor	Intermediate Regional Flood	Standard Project Flood[1]
77.04	County Line Donley Rd.	795.5	806.0	808.0	807.8	810.6
80.03	State Route 87	798.1	809.0	810.8	809.4	812.0
85.31	Hyde Oakfield Rd.	809.9	820.5	822.5	822.5	824.9
85.51	Hoffman Norton Rd.	809.1	822.2	823.6	823.3	825.5
89.67	State Route 88	823.9	837.6	839.4	834.8	836.9
90.17	State Route 534	827.4	838.2	839.9	840.5	842.3
90.56	Wood Curtis Rd	829.1	838.6	840.8	841.6	843.8
90.98	B & O Railroad	831.4	848.3	858.1	844.3	854.9
92.06	Girdle Rd.	834.3	846.8	849.1	849.3	856.7
93.78	Painesville Warren State Rd.	845.1	855.0	856.8	857.6	860.8

[1]Elevations refer to upstream side of respective bridge

Under Executive Order 11296, the Federal government has similar restrictions in that all Federal agencies directly responsible for the construction of Federal facilities must evaluate flood hazards when planning the location of new facilities. In addition, this order requires that Federal agencies responsible for administering Federal grants, loans, or mortgage insurance programs evaluate flood hazards in order to minimize potential flood damage and the need for possible future Federal expenditures for flood protection and flood disaster relief.

Aid to Flood Victims - The Disaster Relief Act of 1970 (Public Law 91-606) provides assistance to communities and persons located in flood hazard areas in the event of a declared major disaster. The Act provides for various types of aid prior to, during, and after the disaster.

The National Flood Insurance Act of 1968 (Public Law 90-448) provides Federally-subsidized, low cost flood insurance to property owners in any community that meets the eligibility requirements. In order to obtain flood insurance eligibility, the localities involved must adopt various land use controls and regulations affecting flood plains. The Flood Disaster Protection Act of 1973 (PL 93-234) now requires States and those communities identified as having "special flood hazard" areas to participate in the flood insurance program as a condition of future Federal financial assistance.

Record of Floods

Information in this report pertaining to past floods was obtained from residents of the area. Since there are no stream gaging stations on this reach of the Grand River, no record of flood heights or discharge rates are available. The following newspaper article excerpts and photographs depict conditions during the flood season in the Grand River valley.

Tribune Chronicle, Warren, O., Wed., Mar. 15, 1972

Mespo Will Continue Fight For Flood Control

. . . Fields sheeted over with ice have melted followed by the first spring rains, and the river and its tributaries such as Coffee and Swine Creeks are rising. This week the river overflowed its banks.

"I hate to see spring come," said one resident who has to use boots to get out of his house because of high water.

Eventually it will be too high for that and boats will come to the rescue.

Every year at this time it's the same old story. And despite efforts to get relief, the story will apparently be the same this year, next year, and for years to come.

If rains continue, the river swollen by recently melted ice and snow coupled with the downpours will undoubtedly burst its banks again. This means some 50 families will need to evacuate until the water goes down again. . . .

FUTURE FLOODS

Great floods have been experienced on the Grand River in the general geographical region of this study. Similar climatological conditions to those causing such large floods could occur over the study area and, in all probability, will occur sometime in the future. The purpose of this section is to delineate those areas that would be inundated by floods of a given magnitude and set forth additional information to help communities develop a plan for reducing the extent of future flood damages.

Extent of Flooding

Intermediate Regional Flood - The Intermediate Regional Flood is defined as a flood having a recurrence interval of once in 100 years at a designated location. However, this is based on a statistical analysis and the flood may actually occur in any year or even in consecutive years. Data for this flood on the Grand River is shown in Table 3. The Intermediate Regional Flood is recommended by the State of Ohio Department of Natural Resources as the minimum flood level to define the limits of the regulatory flood plain. That is, development within these limits should be regulated by local ordinances so as to reduce flood damage potential. The Federal Insurance Administration of the Department of Housing and Urban Development uses like criteria for the flood insurance program.

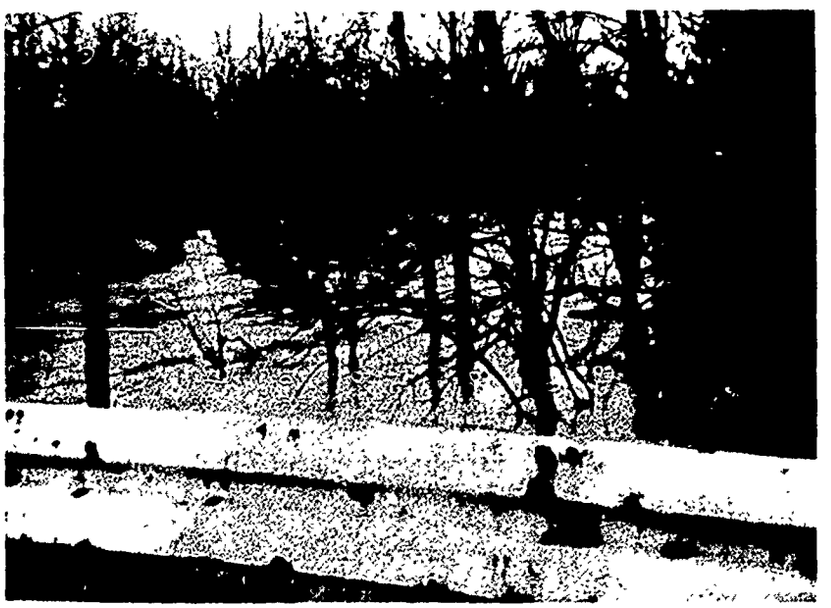


Figure 9—View of Grand River looking upstream from State Route 87 bridge during March, 1970 flood, at river mile 80.03.

Flood Scenes

Figure 10—View of State Route 87, looking east, in the spring of 1974, at river mile 80.03.

Figure 11—View from State Route 87, looking south, in the spring of 1974, at river mile 80.03.

Flood Scenes

Standard Project Flood - The Corps of Engineers, with the cooperation of the National Oceanic and Atmospheric Administration, has made broad and comprehensive studies and investigations of storms and floods and has developed generalized procedures for estimating the flood potential of streams. These procedures have been used in determining the Standard Project Flood, which is defined as the largest flood that can be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical region involved. Only in rare instances would such a storm occur on any specific region. Table 3 also summarizes pertinent data for the Standard Project Flood. There is no frequency assigned to this flood since it is developed from generalized rainfall-runoff data rather than streamflow records. The occurrence of such a flood would indeed be a rare event; however, it could occur in any year. This flood is not the maximum flood that could occur, but it does indicate a reasonable upper limit of the flood plain.

Larger Floods - While larger floods are theoretically possible, the usual climatological characteristics required to produce such a flood would seldom exist. The minimum risk from possible future flood damages that a community is willing to accept should be considered in establishing regulatory flood plain limits or planning for development.

Areas and Depths of Flooding - Areas that would be flooded by the Intermediate Regional and Standard Project Floods are delineated on Plates 3 through 8. An index map of the vicinity is shown on Plate 2. The overflow areas were determined with an accuracy consistent with the objectives of the study and accuracy of available data. Actual limits of the flooded areas may vary somewhat from those shown on the map because the 5-foot contour interval and scale of the map do not permit precise plotting of the flooded area boundaries.

Plates 9 through 11 show the water surface profiles for both floods. The depth of flow in the channel can be estimated at any point from these plates. Determination of these flood profiles was predicated on the assumption that all structures would remain in place throughout the flood and that no accumulation of debris would further restrict waterway openings or block the channel.

The lateral extent of channel overflow at typical cross sections is shown on Plates 12 through 14. Depth of flow outside of the channel resulting from either flood can be estimated from these illustrations. Figures 12-16 show possible future flood heights.

Velocity of Flood Waters - Average velocity of flood waters depends on the size and shape of the cross section, conditions of the stream, and the bed slope of the channel, all of which vary along the stream. Table 3 lists the average velocities that may be expected for peak discharges of the Standard Project and Intermediate Regional Floods. Velocities greater than 3 feet per second combined with depths of 3 feet or greater are generally considered hazardous to life and property.

TABLE 3

INTERMEDIATE REGIONAL AND STANDARD PROJECT FLOOD DISCHARGES AND AVERAGE VELOCITIES

Distance Upstream From Mouth, Mile	Discharge cfs	Average Velocity[1] feet per second	
		Channel	Overbank
	Intermediate Regional Flood		
71.3 - 73.6	8,700	3.2	0.5
73.6 - 76.6	8,100	3.6	0.5
76.6 - 77.0	8,000	2.9	0.5
77.0 - 82.5	7,600	3.4	0.6
82.5 - 85.5	7,200	3.5	0.5
85.5 - 86.8	7,000	5.2	0.6
86.8 - 87.6	6,800	8.0	0.8
87.6 - 94.9	6,600	6.0	1.3
	Standard Project Flood		
71.3 - 73.6	22,900	3.8	0.8
73.6 - 76.6	21,000	4.0	0.8
76.6 - 77.0	20,500	3.3	0.8
77.0 - 82.5	19,500	3.8	0.9
82.5 - 85.5	18,900	4.2	0.8
85.5 - 86.8	18,800	6.8	1.0
86.8 - 87.6	18,500	9.3	1.2
87.6 - 94.9	18,000	6.2	1.8

[1]Average velocities within the indicated reach of stream.

The accumulation of ice or debris at constricted sections of the channel may affect the characteristics of flood flow. Such accumulation acts as a dam and causes water to back up forming a pond. If sufficient head accumulates to break the dam, a surge of water would flow downstream causing an increase in both the discharge and velocity values. Since the occurrence and amount of accumulation are indeterminate factors, the values in Table 3 do not reflect such conditions.

Reducing the Damages

The information contained in this report will not by itself reduce the flood damage potential. Local action will be required to implement a flood plain management program in order to curb the rise of potential flood damages. Although specific plans are not set forth for the study area, several Federal and State agencies, upon request, can provide additional assistance to the local units of government in developing a workable plan for reduction of flood damages and promoting the wise use of the flood plains.

Figure 12—Heights of the Standard Project and Intermediate Regional Floods are shown by the arrows on the County Line Donley Road bridge at river mile 77.04

Figure 13—Heights of the Standard Project and Intermediate Regional Floods are shown by the arrows on the Hyde Oakfield Road bridge at river mile 85.31.

Possible Future Flood Heights
Photos Taken October, 1974

Figure 14—Heights of the Standard Project and Intermediate Regional Floods are shown by the arrows on the State Route 88 bridge at river mile 89.67

Figure 15—Heights of the Standard Project and Intermediate Regional Floods are shown by the arrows on the Wood Curtis Road bridge at river mile 90 56.

Possible Future Flood Heights
Photos Taken October, 1974

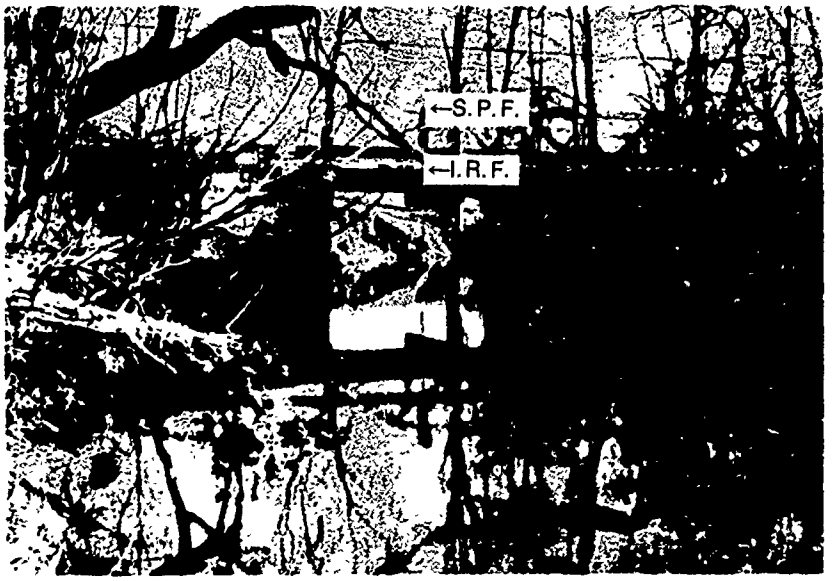


Figure 16—Heights of the Standard Project and Intermediate Regional Floods are shown by the arrows on the Girdle Road bridge at river mile 92.06.

Possible Future Flood Heights
Photos Taken October, 1974

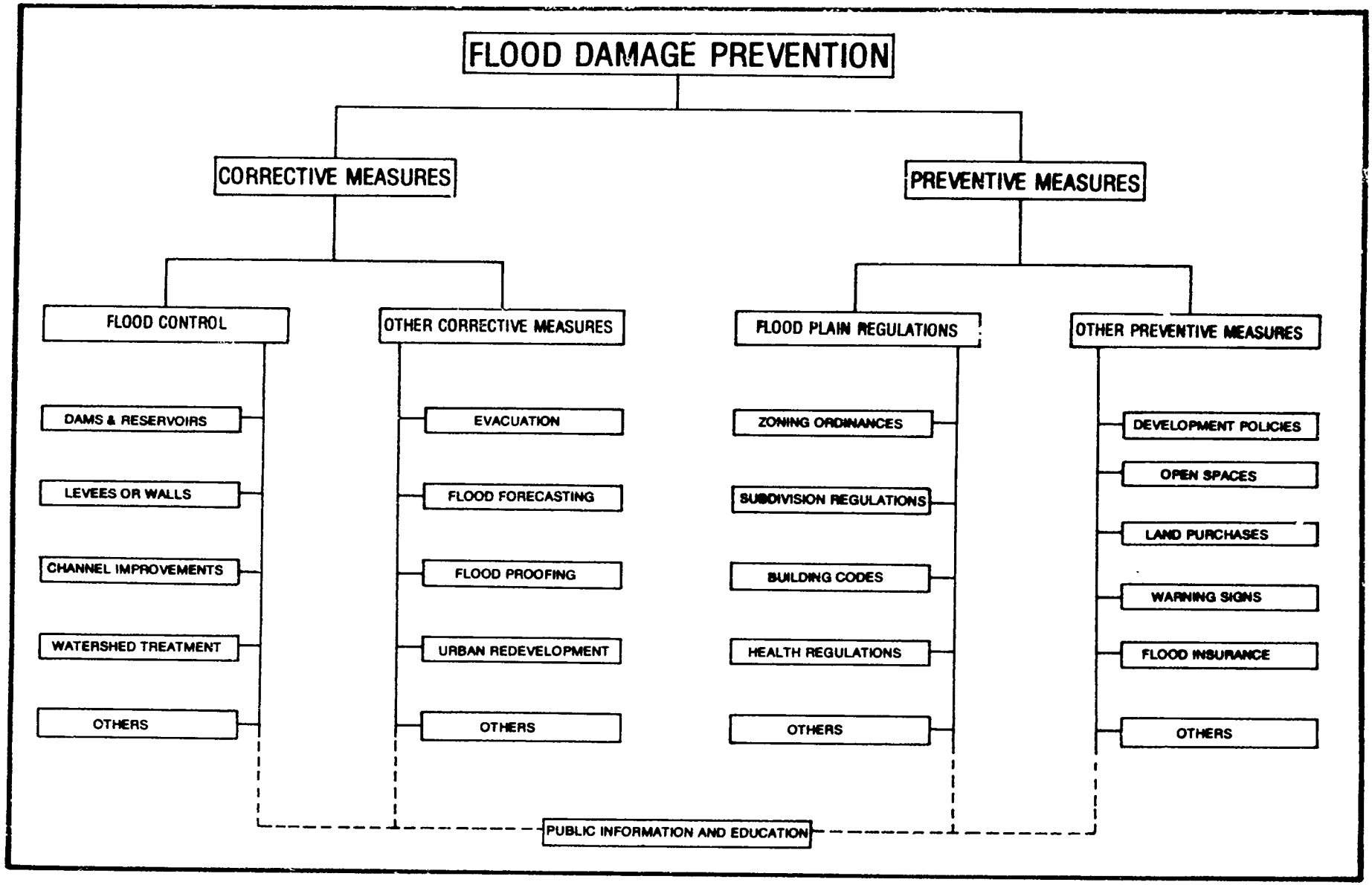
State Assistance - The Ohio Department of Natural Resources, Division of Planning, Flood Plain Management Section administers Ohio's flood plain management program. The major objective of the program is to ensure the wise use of Ohio's flood plain areas. They perform various functions including collection of flood data, special analysis of flood hazard sites, and development of model ordinances and regulations for flood plain use.

The program is directed at the local level since the power to control the use of flood plain lies with local governments in Ohio. Technical data and planning assistance is provided to local communities requesting help. The Flood Plain Management Section is also the State Coordinating Agency for the National Flood Insurance Program. Information is provided on the insurance program and local communities are assisted in establishing eligibility for flood insurance.

Federal Assistance - The Department of Housing and Urban Development administers the National Flood Insurance Program. Currently, only the unincorporated areas within the study area are eligible. In addition, both the U.S. Soil Conservation Service and U.S. Geological Survey are active in flood study programs coordinated with the State.

The Corps of Engineers also maintains a Flood Plain Management Services program. Information, guidance, and advice on flood hazards and the wise use of flood plains are available to Federal, State, and local agencies. The program includes preparation of this and other flood plain information studies and provision of technical assistance for the collection, preparation, and analysis of flood data. Guidelines and pamphlets pertaining to flood plain regulations, flood proofing, and other related subjects are available to public and governmental interests. Comprehensive flood damage prevention planning is also available through this program.

To assist local governments in managing and controlling their flood plains, the U.S. Army Corps of Engineers has prepared and will, upon request, distribute to State, county, and local governments copies of pamphlets entitled, "Guidelines for Reducing Flood Damages" and "Introduction to Flood Proofing." These pamphlets together with information presented in this report should provide a base upon which local governments may develop a sound program to reduce damage to existing and future development within the flood plain of the Grand River in Trumbull County, Ohio. Figure 17 lists the corrective and preventive measures described in the above mentioned pamphlets. The U.S. Army Corps of Engineers will distribute to State, county, and local governments other helpful pamphlets, as well as additions to existing pamphlets as they are developed.



Flood damage prevention measures

Figure 17

GLOSSARY OF TERMS

Discharge. The quantity of flow in a stream at any given time, usually measured in cubic feet per second (cfs).

Flood. An overflow of lands not normally covered by water and that are used or usable by man. Floods have two essential characteristics: The inundation of land is temporary; and the land is adjacent to and inundated by overflow from a river or stream or an ocean, lake, or other body of standing water.

Normally, a "flood" is considered as any temporary rise in streamflow or stage, but not the ponding of surface water, that results in significant adverse effects in the vicinity. Adverse effects may include damages from overflow of land areas, temporary backwater effects in sewers and local drainage channels, creation of unsanitary conditions or other unfavorable situations by deposition of materials in stream channels during flood recessions, rise of groundwater coincident with increased streamflow, and other problems.

Flood Crest. The maximum stage or elevation reached by the waters of a flood at a given location.

Flood Peak. The maximum instantaneous discharge of a flood at a given location. It usually occurs at or near the time of the flood crest.

Flood Plain. The relatively flat area or low lands adjoining the channel of a river, stream, or watercourse or ocean, lake or other body of standing water which has been or may be covered by flood water.

Flood Profile. A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance above mouth, for a stream of water flowing in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood, but may be prepared for conditions at a given time or stage.

Flood Stage. The stage or elevation at which overflow of the natural banks of a stream or body of water begins in the reach or area in which the elevation is measured.

Head Loss. The effect of obstructions, such as narrow bridge openings or buildings that limit the area through which water must flow, raising the surface of the water upstream from the obstruction.

Hydrograph. A curve denoting the discharge or stage of flow over a period of time.

Intermediate Regional Flood. A flood having an average frequency of occurrence in the order of once in 100 years although the flood may occur in any year. It is based on statistical analyses of streamflow records available for the watershed and analyses of rainfall and runoff characteristics in the "general region of the watershed."

Left Bank. The bank on the left side of a river, stream, or watercourse, looking downstream.

Low Steel (or Underclearance). See "underclearance."

Right Bank. The bank on the right side of a river, stream, or watercourse, looking downstream.

Standard Project Flood. The flood that may be expected from the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the geographical area in which the drainage basin is located, excluding extremely rare combinations. Such floods, as used by the Corps of Engineers, are intended as practicable expressions of the degree of protection that should be sought in the design of flood control works, the failure of which might be disastrous.

Underclearance. The lowest point of a bridge or other structure over or across a river, stream, or watercourse that limits the opening through which water flows. This is referred to as "low steel" in Table 2.

AUTHORITY, ACKNOWLEDGMENTS, AND INTERPRETATION OF DATA

This report has been prepared by Burgess & Niple, Limited under the direction of the Buffalo District of the U.S. Army Corps of Engineers in accordance with the authority granted by Section 206 of the Flood Control Act of 1960 (PL 86-465) as amended.

* * *

Assistance and cooperation of Federal, State, and local agencies and individuals in supplying useful information and photographs of past floods is appreciated.

* * *

The Buffalo District will provide, upon request, interpretation and limited technical assistance in the application of these data, particularly as to their use in developing effective flood plain regulations. Requests should be coordinated through the Ohio Department of Natural Resources, Division of Planning. After local authorities have selected the flood magnitude or frequency to be used as the basis for regulation, further information on the effects of various widths of floodway on the profile of the selected flood can be provided to assist in final selection of floodway limits.

TABLE 4

BENCH MARKS[1] ON GRAND RIVER

Bench Mark Designation	Elevation[2] Feet on U.S.C. & G.S. Datum	Description
T.B.M. "Pipe"	804.9	A chiseled cross in the top of the west end of corrugated pipe under Mahan Parker Road north of County Line Donley Road.
B.M. "Bridge 3"	807.8	A chiseled square on top of east concrete abutment of County Line Donley Road bridge.
T.B.M. "Coffee"	805.8	A chiseled square on top of north stone abutment of Combs Road bridge over Coffee Creek.
C164	809.2	A standard U.S.C. & G.S. disc on top of west concrete abutment of Route 87 bridge.
L15	870.2	A standard U.S.C. & G.S. disc near B & O R.R. station at West Farmington. North of Route 88 on concrete post projecting 12".
X160	876.3	A standard U.S.C. & G.S. disc at North Briston at intersection of Route 45 and Hyde Oakfield Road in a concrete post projecting 3".
B.M. "Bridge 5"	822.2	A chiseled square on top of west concrete abutment of Hyde Oakfield Road bridge.
B.M. "Bridge 6"	823.9	A chiseled square on top of south stone abutment of Hoffman Norton Road bridge.
B163	840.3	A standard U.S.C. & G.S. disc south of intersection of Route 534 and Route 88 on top of east concrete abutment of the second bridge from Farmington.
T.B.M. "Dead"	834.0	A chiseled square on top of west concrete abutment of Route 88 bridge over Dead Branch.
B.M. "Bridge 7"	838.9	A chiseled square on top of west concrete abutment of Route 88 bridge.
Z160	888.3	A standard U.S.C. & G.S. disc in concrete post on east side of Route 45 at intersection of Norton Lane, south of North Bloomfield.
B.M. "Bridge 9"	840.9	A chiseled square on top of north concrete abutment of Wood Curtis Road bridge

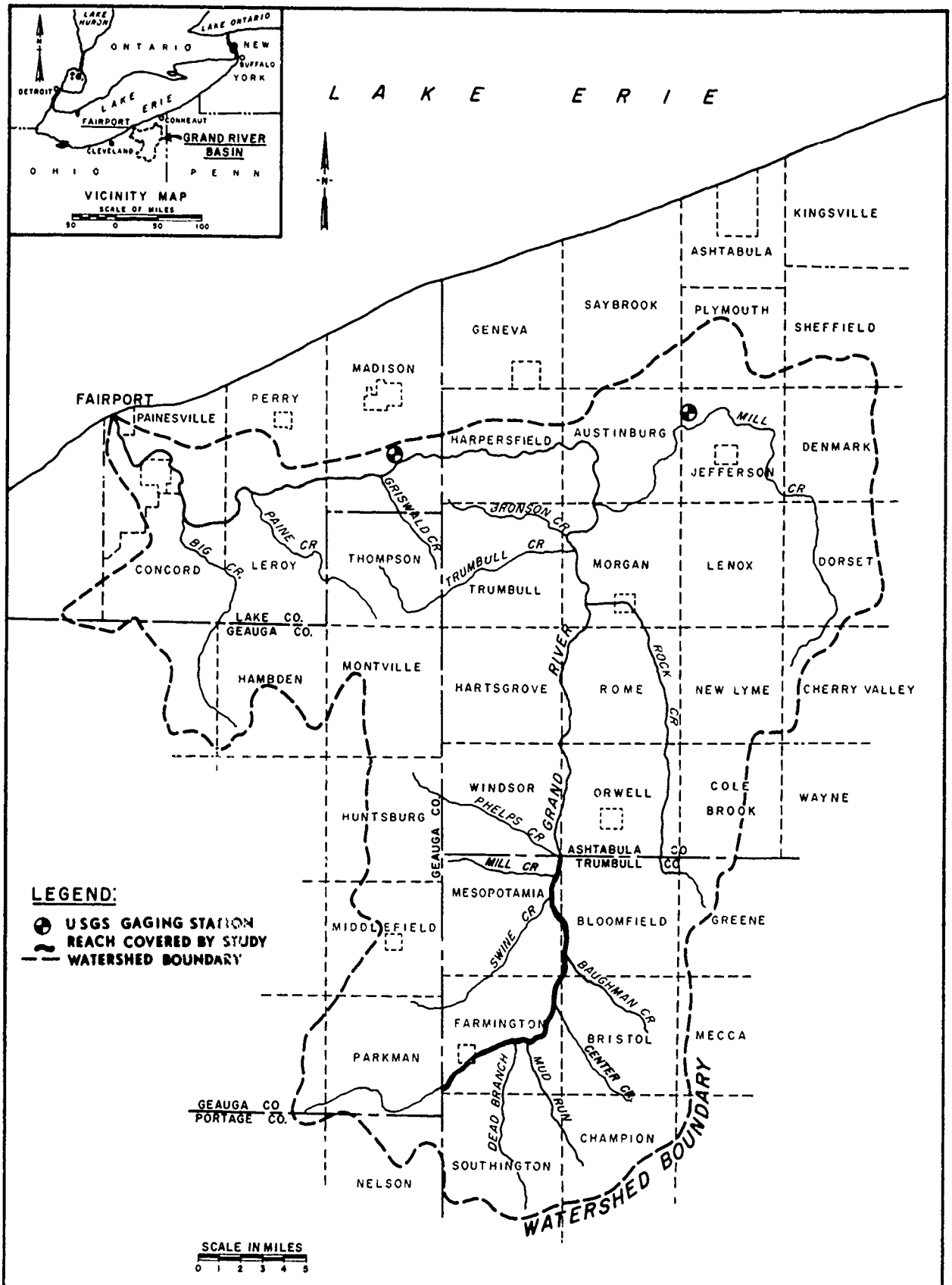
TABLE 4 (Continued)

BENCH MARKS[1] ON GRAND RIVER

Bench Mark Designation	Elevation[2] Feet on U.S.C. & G.S. Datum	Description
B.M. "R.R."	857.2	A chiseled square on top of north concrete abutment of B & O R.R. bridge.
B.M. "Bridge 11"	848.1	A chiseled square on top of north concrete abutment of Girdle Road bridge.
B.M. "Bridge 12"	856.5	A chiseled square on top of south concrete abutment of Painesville Warren State Road bridge.

[1]Bench Mark - A point of known elevation, usually a mark cut into some durable material as stone or concrete, to serve as a reference point in running a line of levels for the determination of elevations. The list is furnished as an aid to local interests in setting minimum elevations for future development or establishing other elevations necessary to flood plain planning.

[2]Elevations established by Corps of Engineers during field surveys in August-November, 1974. File No. GR-1.

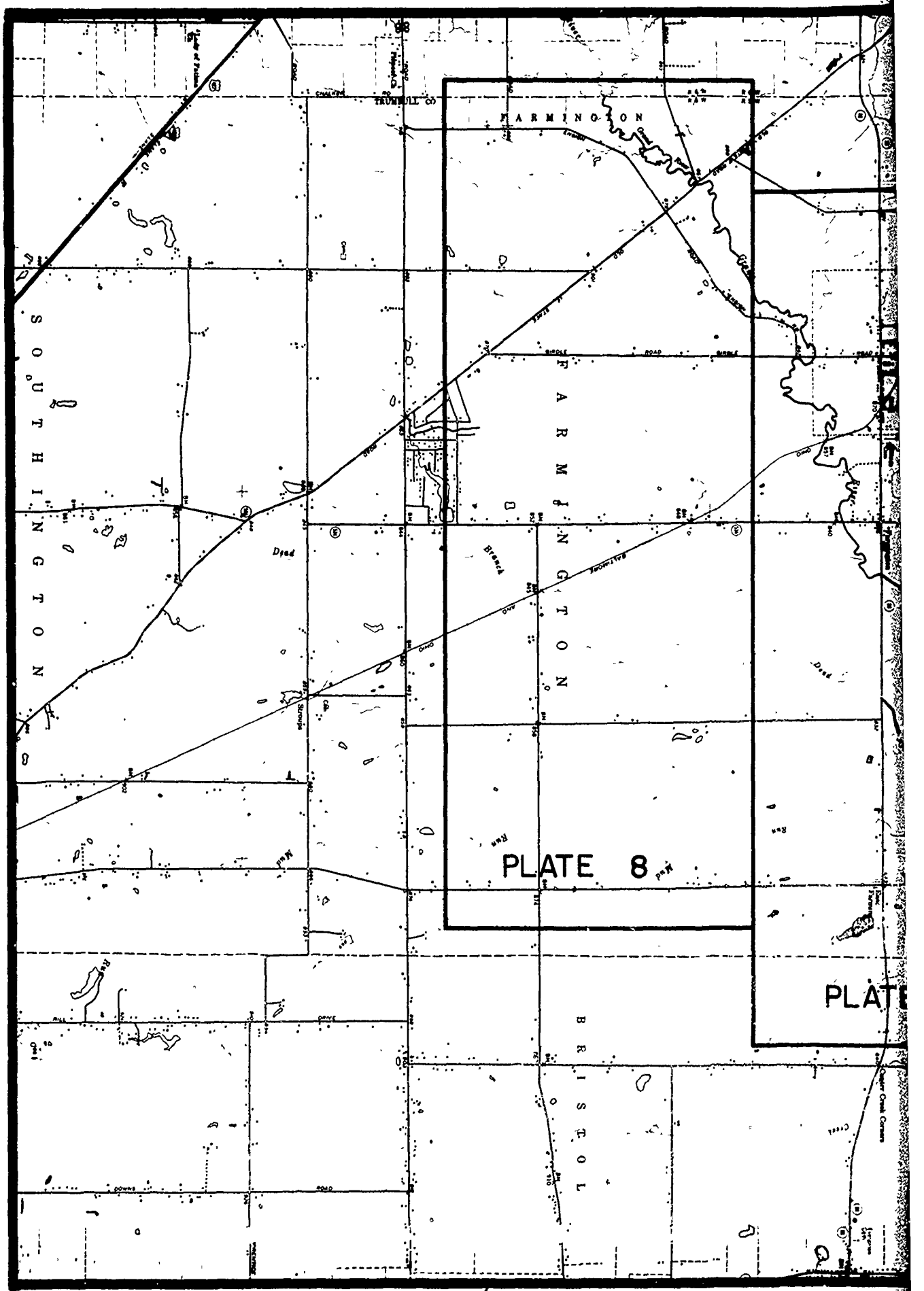


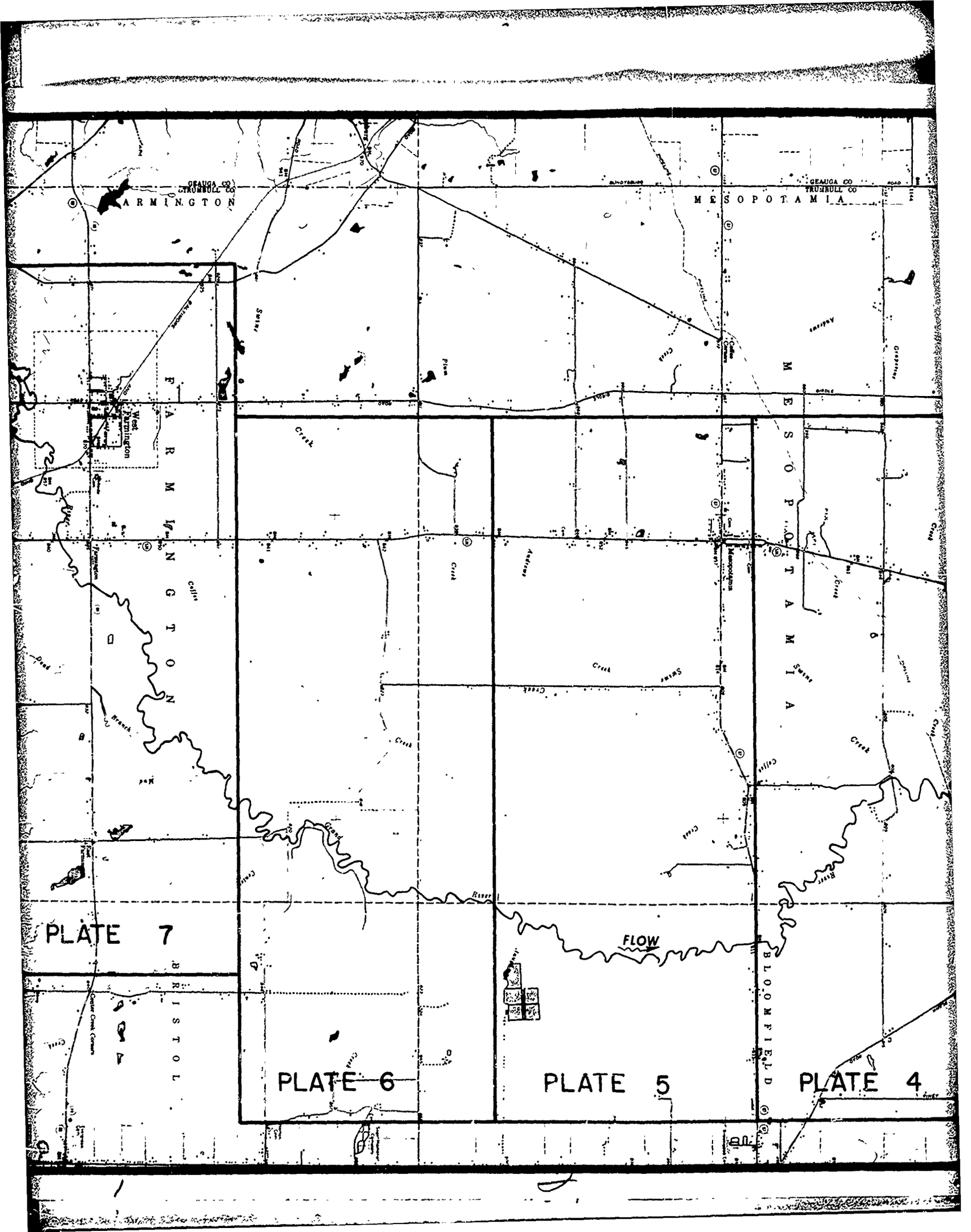
GRAND RIVER
TRUMBULL COUNTY, OHIO
FLOOD PLAIN INFORMATION REPORT

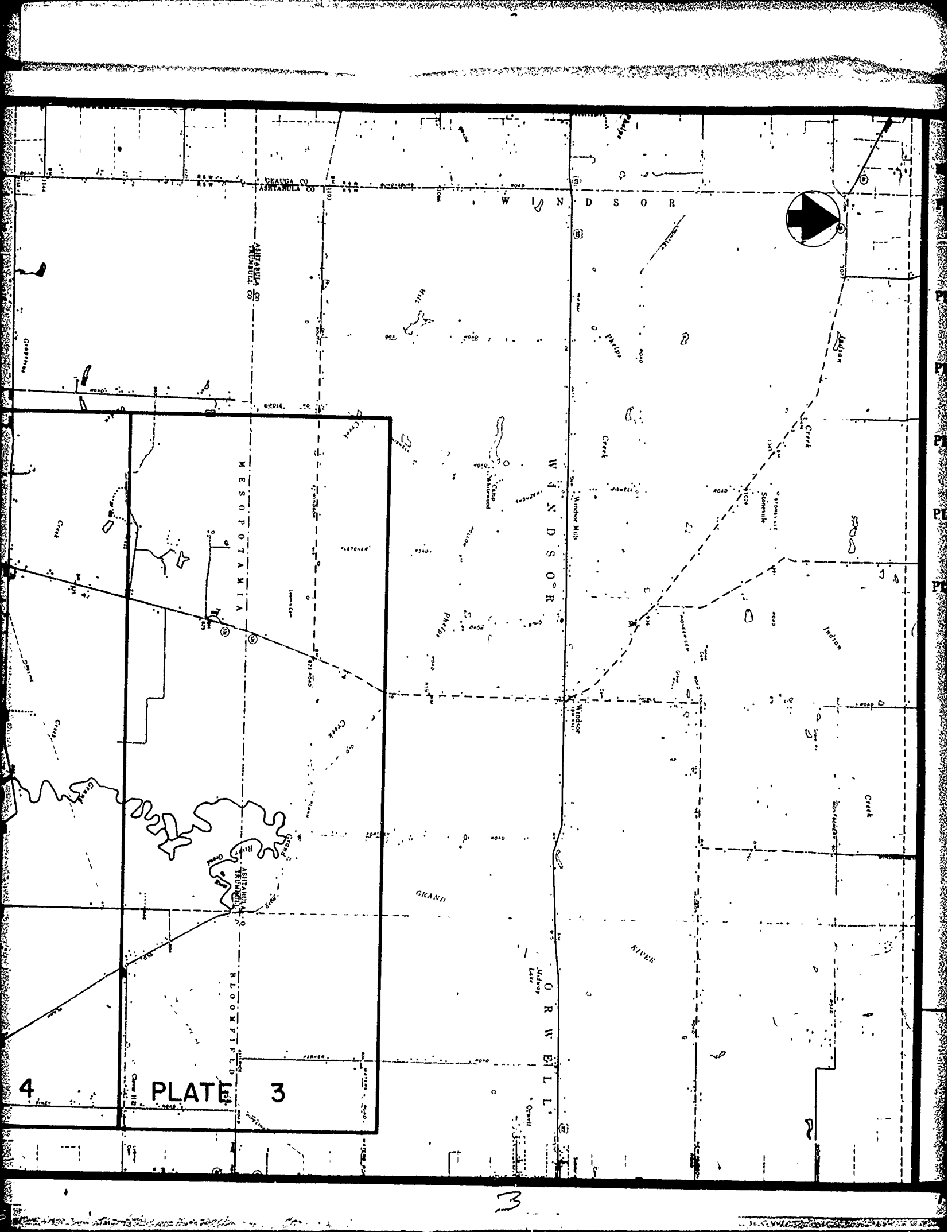
BASIN MAP

U.S. ARMY ENGINEER DISTRICT, BUFFALO
JULY 1975

PLATE 1


FARMINGTON
SOUTHINGTON
FARMINGTON
BRISTOL
PLATE 8
PLAT


GEAUGA CO
TRUMBULL CO
ARMINGTON
MESOPOTAMIA
West Farmington
FARMINGTON
MESOPOTAMIA
BRISTOL
BLOOMFIELD
FLOW
PLATE 7
PLATE 6
PLATE 5
PLATE 4


GEAUGA CO
ASHTABULA CO
W I N D S O R
MESOPOTAMIA
W I N D S O R
Creek
Windsor Mills
Indian
Creek
GRAND
RIVER
O R W E L L
B L O O M F I E L D
4
PLATE 3

Note:

PLATE 3 reproduced from U.S.G.S. 7.5 min. quadrangle sheets, WINDSOR, 1959 (Photorevised 1970) and WEST FARMINGTON, 1952 (Photorevised 1970).

PLATE 4 reproduced from U.S.G.S. 7.5 min. quadrangle sheet, WEST FARMINGTON, 1952 (Photorevised 1970).

PLATE 5 reproduced from U.S.G.S. 7.5 min. quadrangle sheet, WEST FARMINGTON, 1952 (Photorevised 1970).

PLATE 6 reproduced from U.S.G.S. 7.5 min. quadrangle sheet, WEST FARMINGTON, 1952 (Photorevised 1970).

PLATE 7 reproduced from U.S.G.S. 7.5 min. quadrangle sheet, WEST FARMINGTON, 1952 (Photorevised 1970).

PLATE 8 reproduced from U.S.G.S. 7.5 min. quadrangle sheets, WEST FARMINGTON, 1952 (Photorevised 1970); SOUTHINGTON, 1952 (Photorevised 1970); GARRETTSVILLE, 1959 (Photorevised 1970) and MIDDLEFIELD, 1959 (Photorevised 1970).

0 4000 8000
SCALE IN FEET

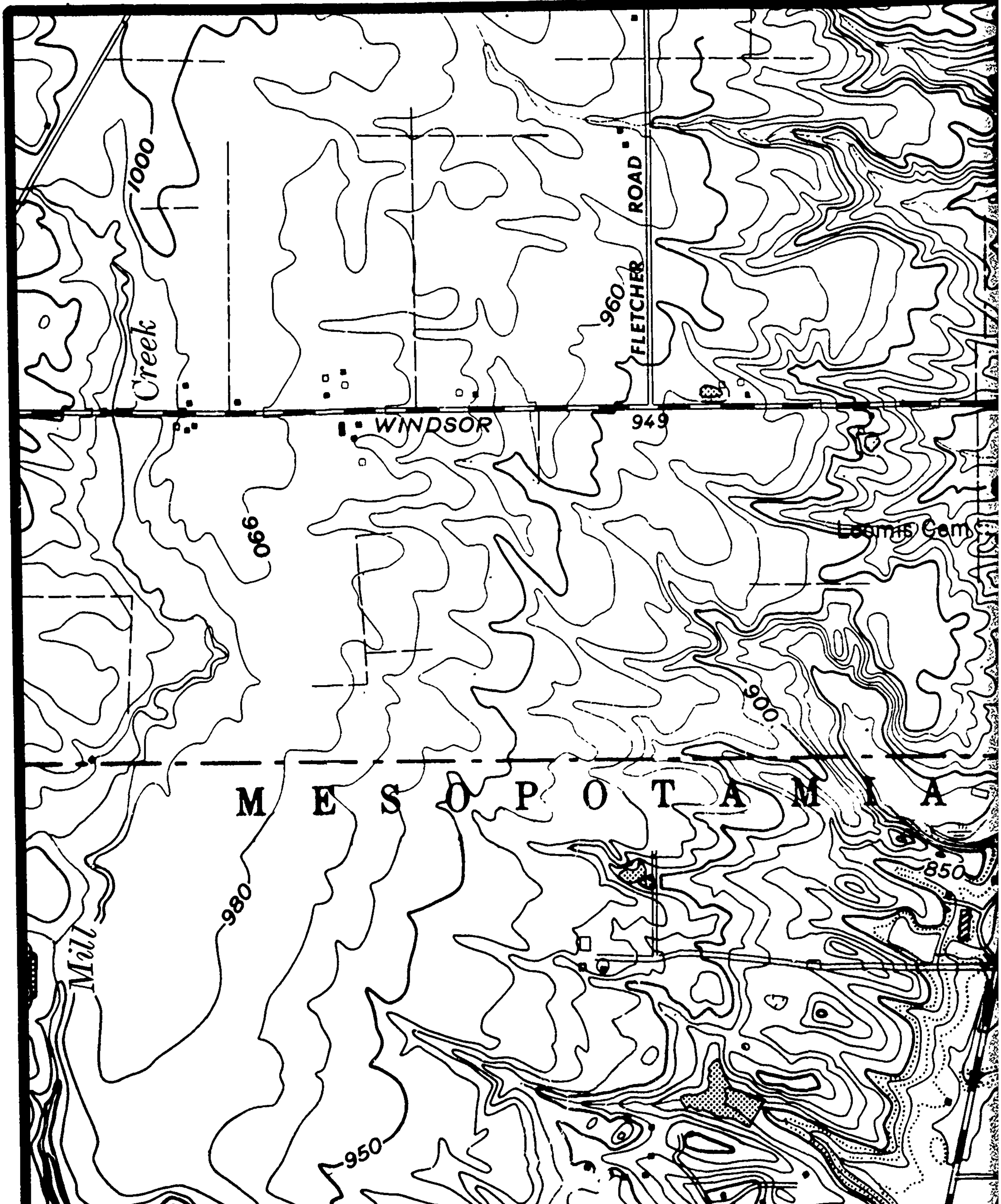
GRAND RIVER
TRUMBULL COUNTY, OHIO

FLOOD PLAIN INFORMATION REPORT

INDEX MAP
FOR FLOODED AREA MAPS

U.S. ARMY ENGINEER DISTRICT, BUFFALO
JULY 1975

PLATE 2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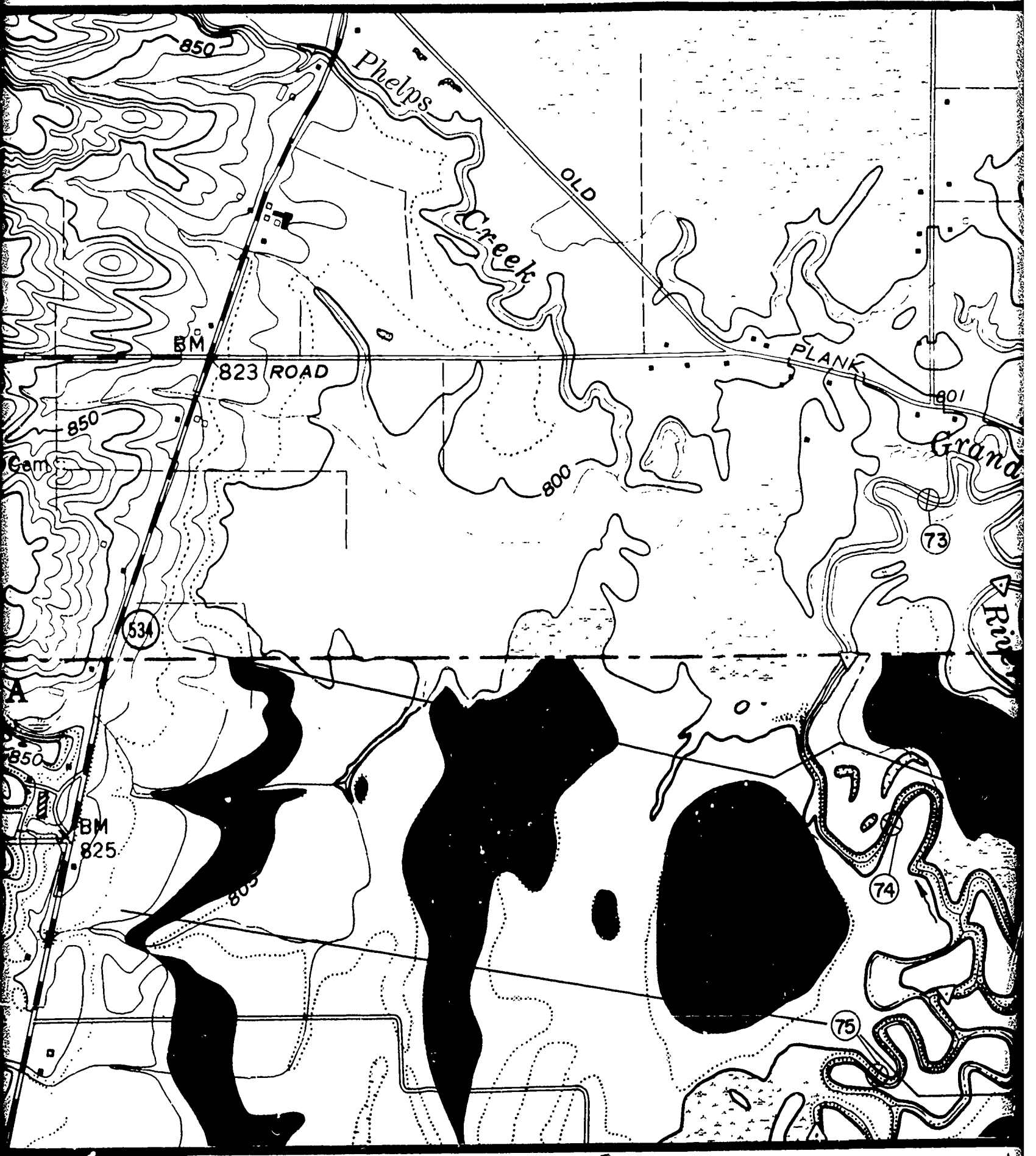
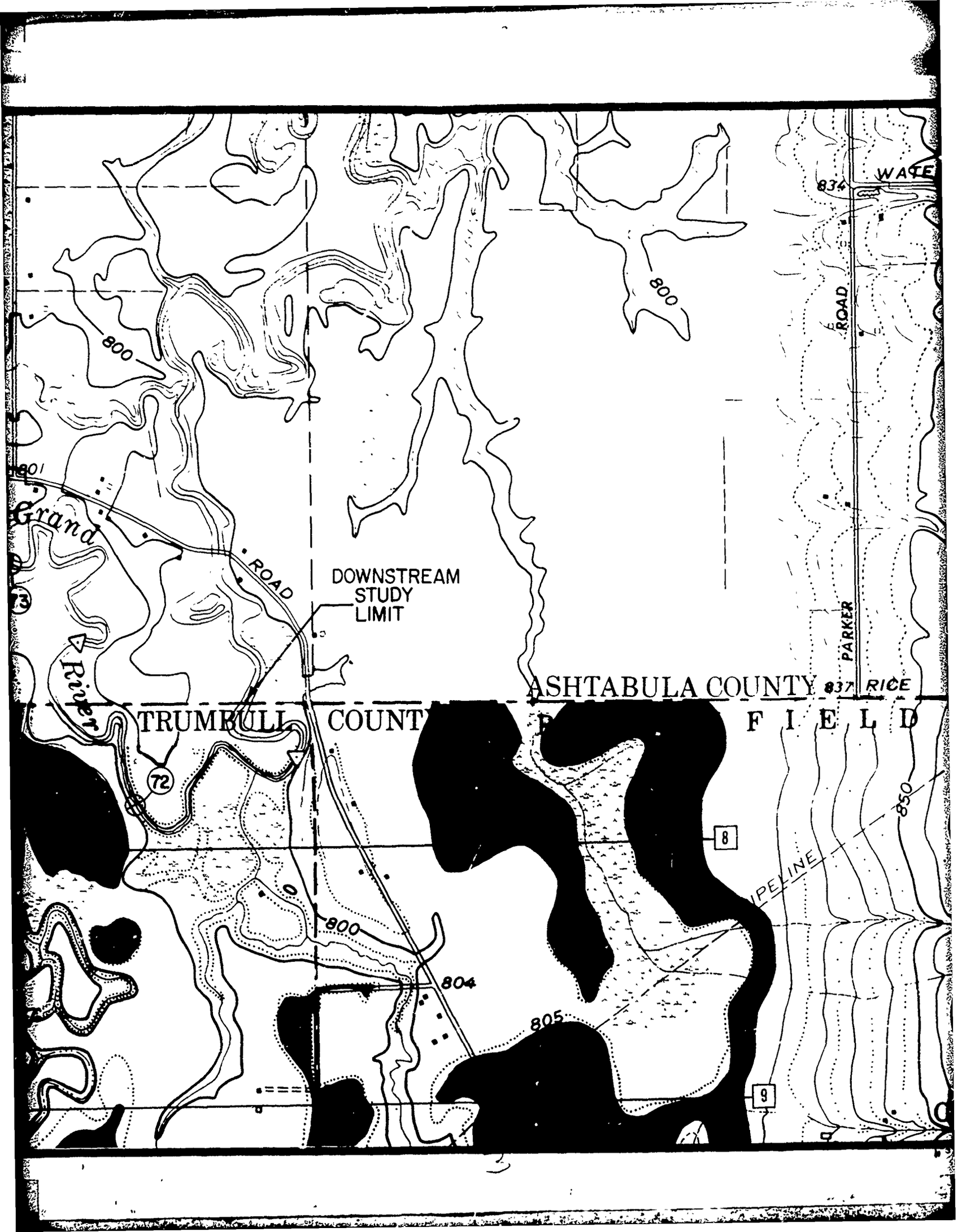
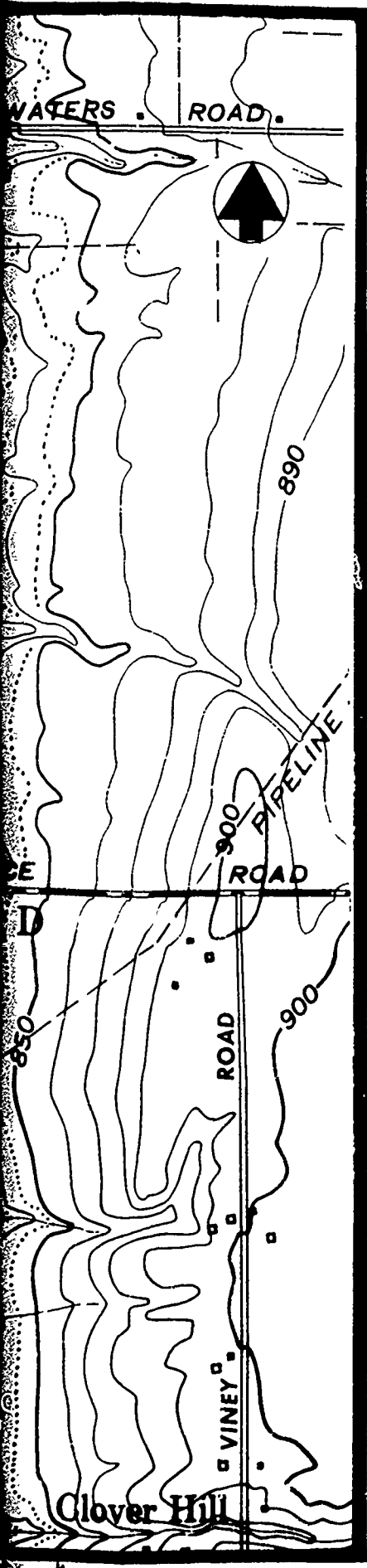
Creek
ROAD
FLETCHER
960
WINDSOR
949
990
Loomis Cem
900
M E S O P O T A M I A
850
980
Mill
950
850


850
Phelps
OLD
Creek
BM
823
ROAD
PLANK
801
850
Gem
800
73
534
A
850
BM
825
805
74
75


834
WATE
800
ROAD
800
801
Grand
ROAD
DOWNSTREAM
STUDY
LIMIT
PARKER
River
ASHTABULA COUNTY
837
RICE
TRUMBULL COUNT
F I E L D
72
8
850
IPELINE
800
804
805
9



LEGEND

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

(73) DISTANCE FROM MOUTH IN MILES

△ HALF MILE POINTS

[9] LOCATION OF VALLEY CROSS SECTION

CONTOUR INTERVAL 10 FEET.
DOTTED LINES REPRESENT HALF-INTERVAL CONTOURS.

LIMITS OF OVERFLOW INDICATED MAY VARY SOME FROM ACTUAL LOCATIONS ON GROUND AS EXPLAINED IN THIS REPORT.

0 1000 2000

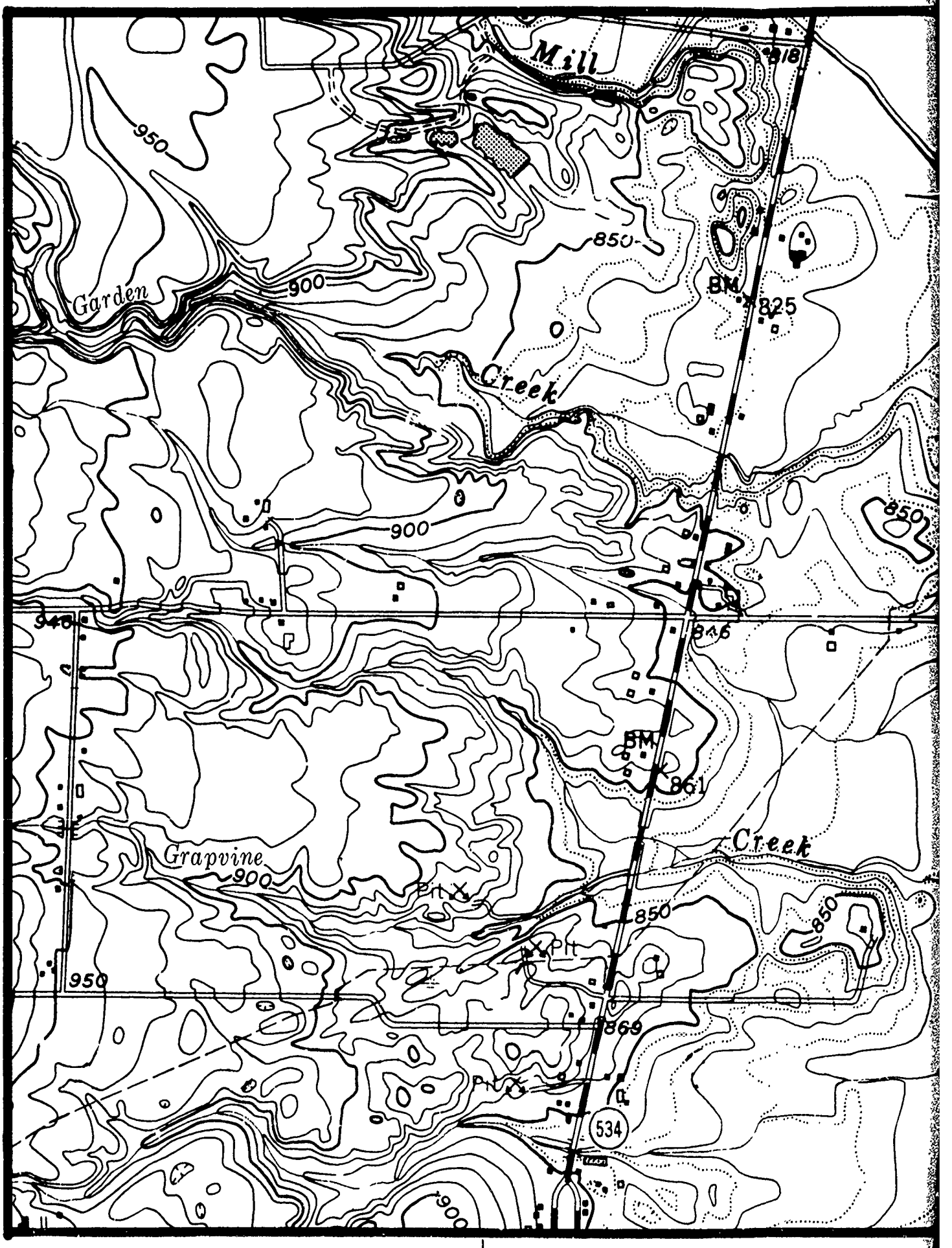
SCALE IN FEET

GRAND RIVER
TRUMBULL COUNTY, OHIO

FLOOD PLAIN INFORMATION REPORT

FLOODED AREA MAP
MILE 71.30 TO 75.56

U.S. ARMY ENGINEER DISTRICT, BUFFALO
JULY 1975


Mill
950
850
Garden
900
Creek
BM
825
900
850
946
946
BM
861
Creek
Grapvine
900
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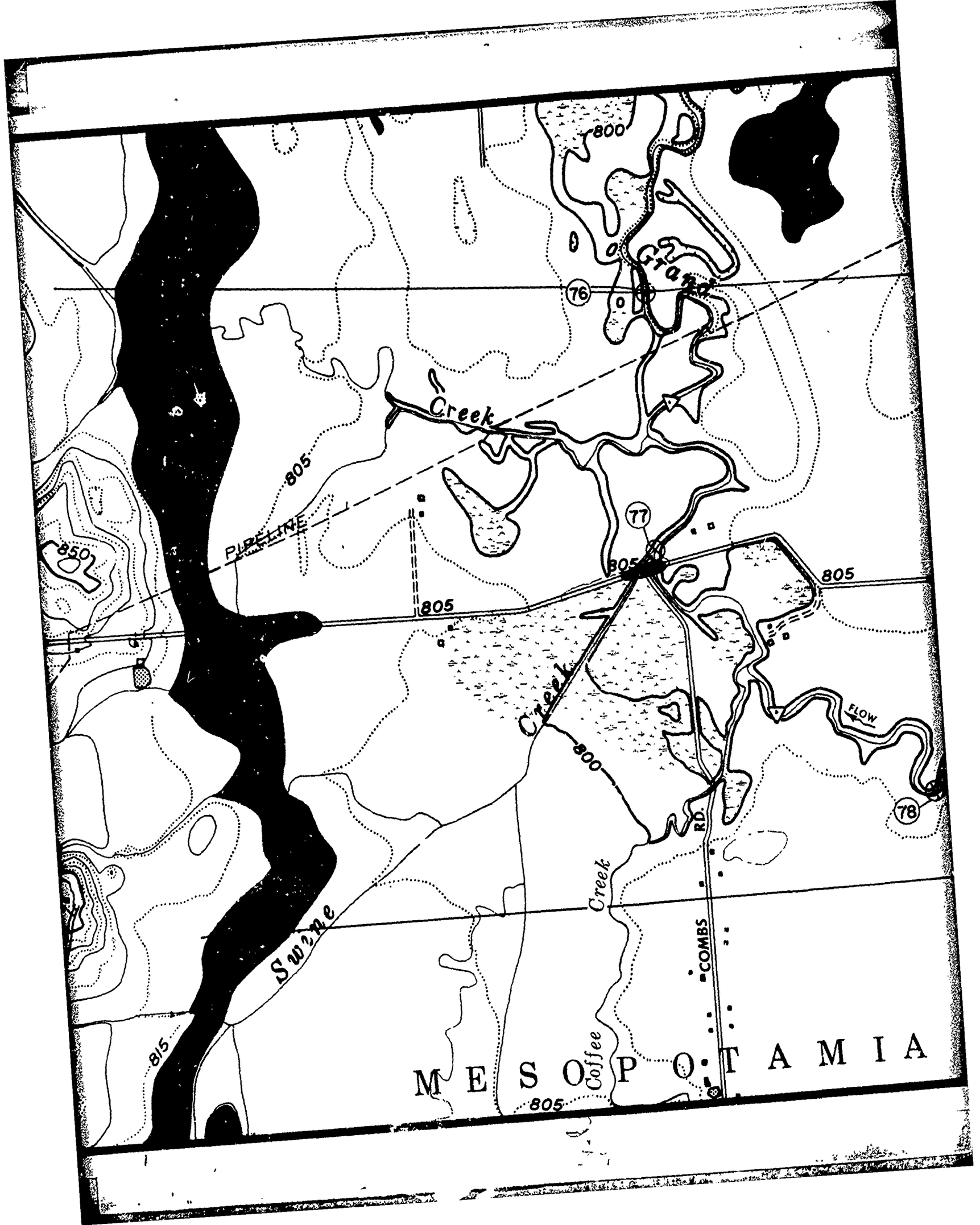
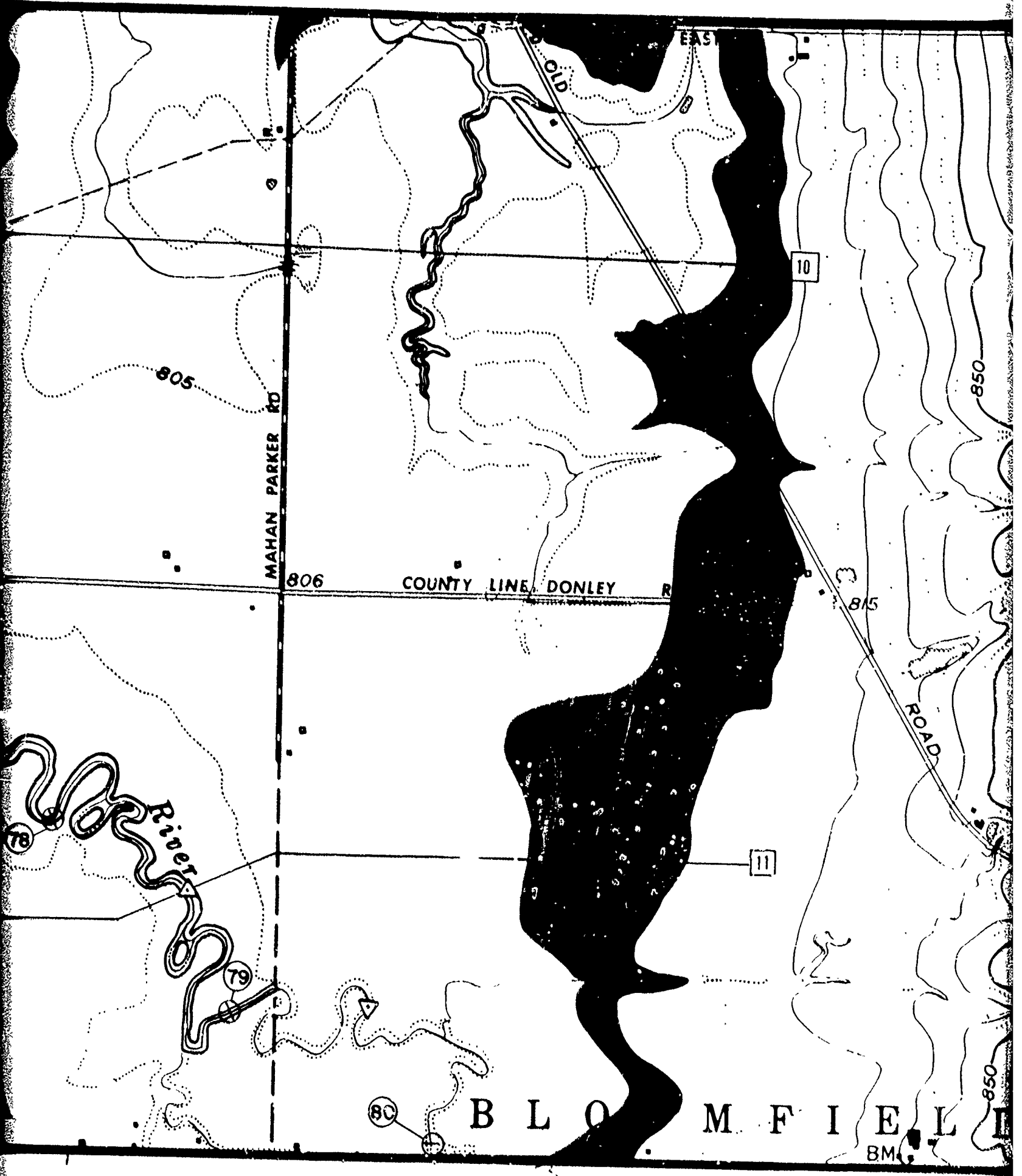
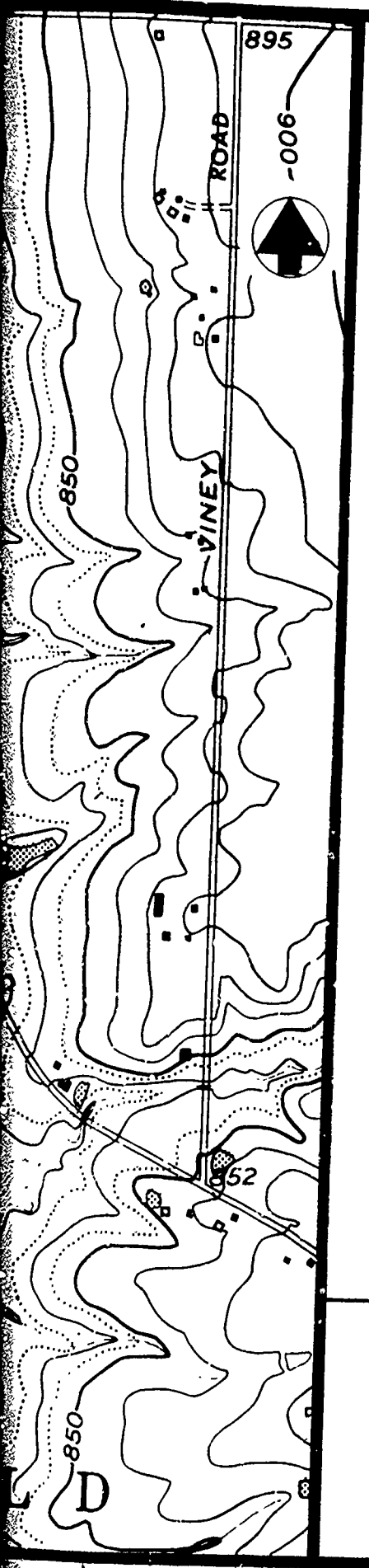
850
Pit
950
869
Pit
534
900


800
76
Creek
805
PIPELINE
850
77
805
805
805
Creek
800
FLOW
78
RD.
Creek
COMBS
Swayne
815
Coffee
805
MESOPOTAMIA


EAST
OLD
10
805
MAHAN PARKER RD
806
COUNTY LINE
DONLEY
815
850
ROAD
River
78
79
11
80
BLOOMFIELD
BM



LEGEND

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

(77) DISTANCE FROM MOUTH IN MILES

△ HALF MILE POINTS

[10] LOCATION OF VALLEY CROSS SECTION

CONTOUR INTERVAL 10 FEET.
DOTTED LINES REPRESENT HALF-INTERVAL CONTOURS

LIMITS OF OVERFLOW INDICATED MAY VARY SOME FROM ACTUAL LOCATIONS ON GROUND AS EXPLAINED IN THIS REPORT.

0 1000 2000
SCALE IN FEET

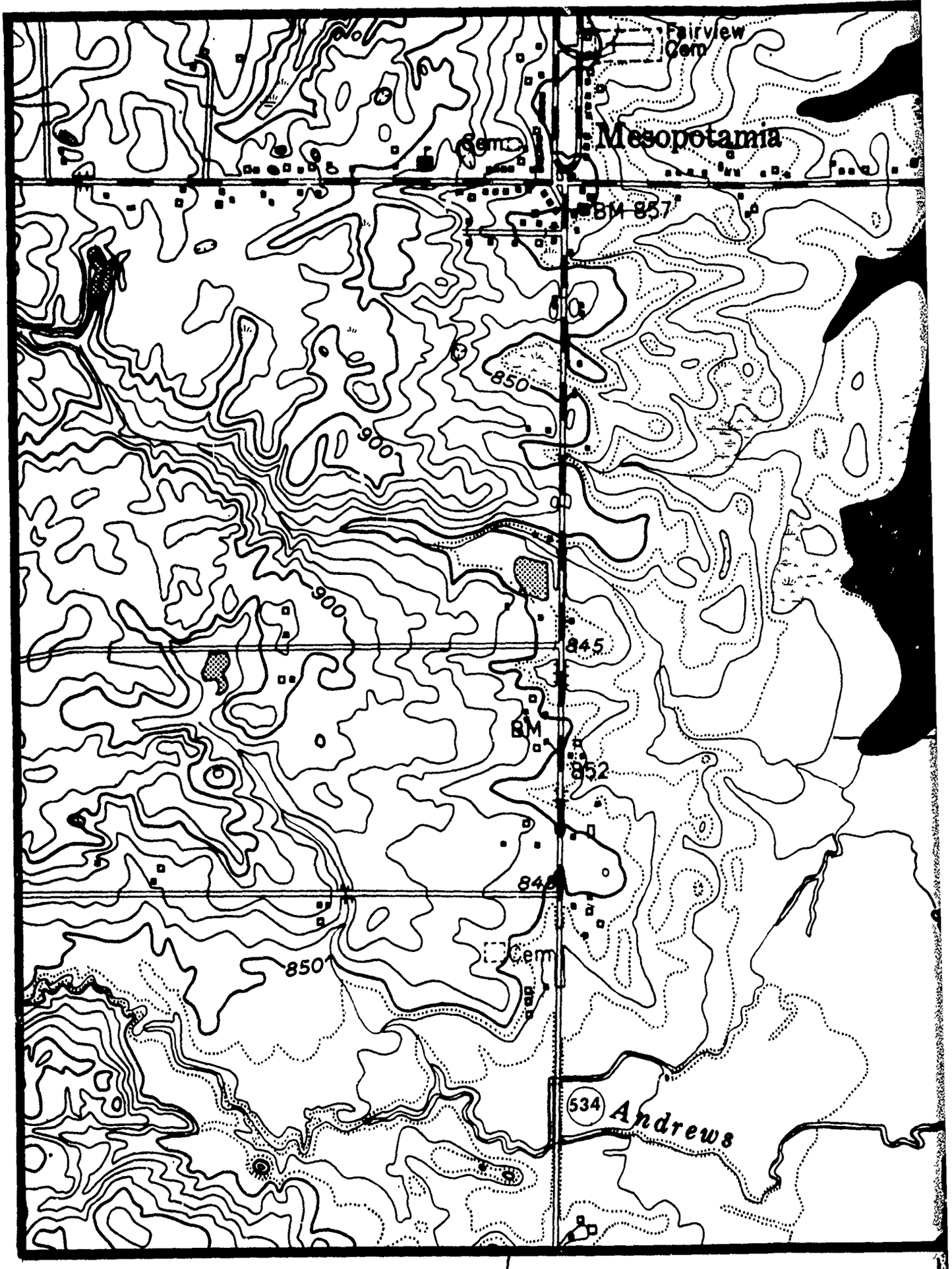
GRAND RIVER
TRUMBULL COUNTY, OHIO

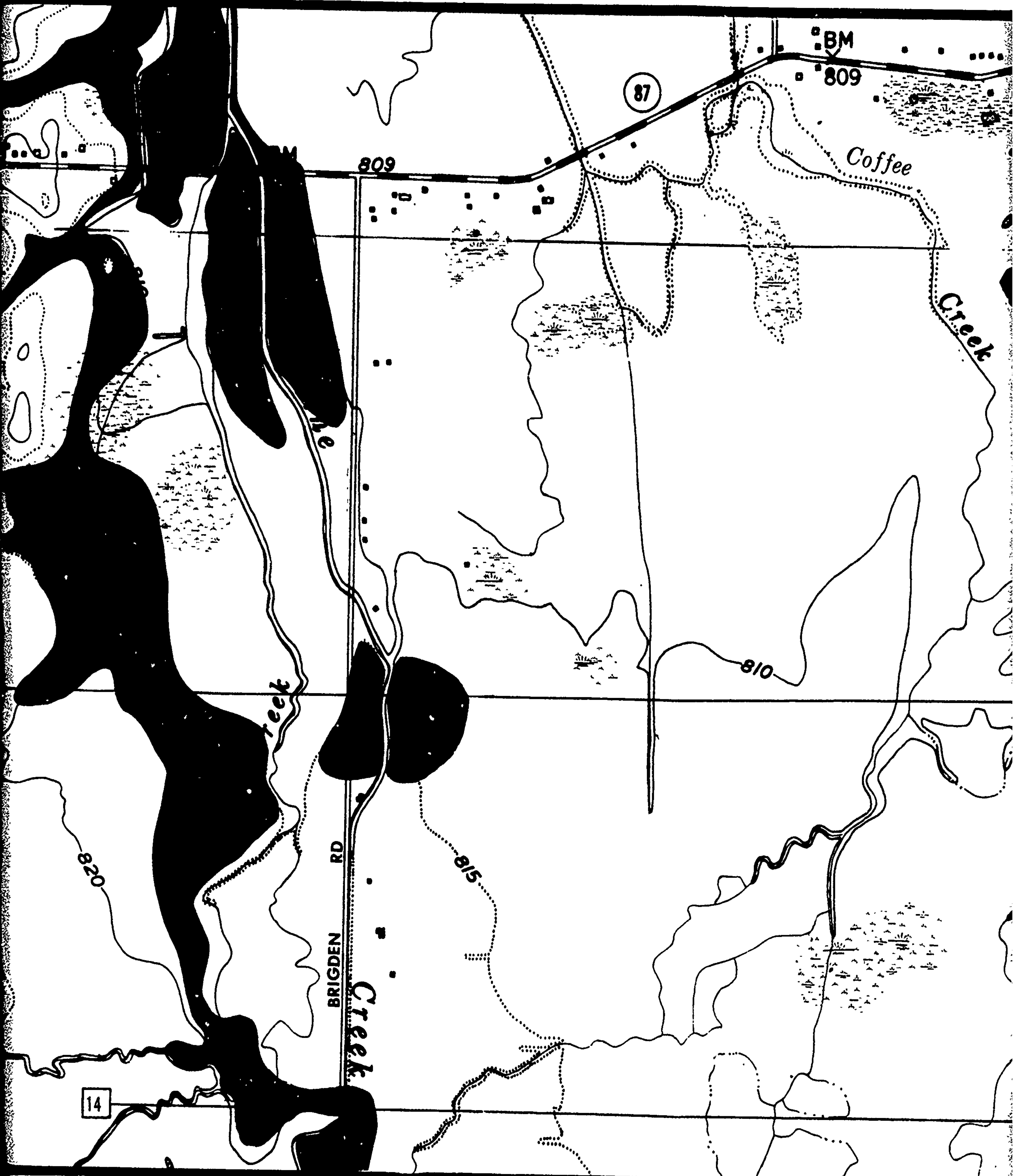
FLOOD PLAIN INFORMATION REPORT

FLOODED AREA MAP
MILE 75.56 TO 80.02

U.S. ARMY ENGINEER DISTRICT, BUFFALO
JULY 1975

PLATE 4


Fairview
Cem
Cem
Mesopotamia
BM 857
850
900
900
845
BM
852
840
Cem
850
534
Andrews



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809
87
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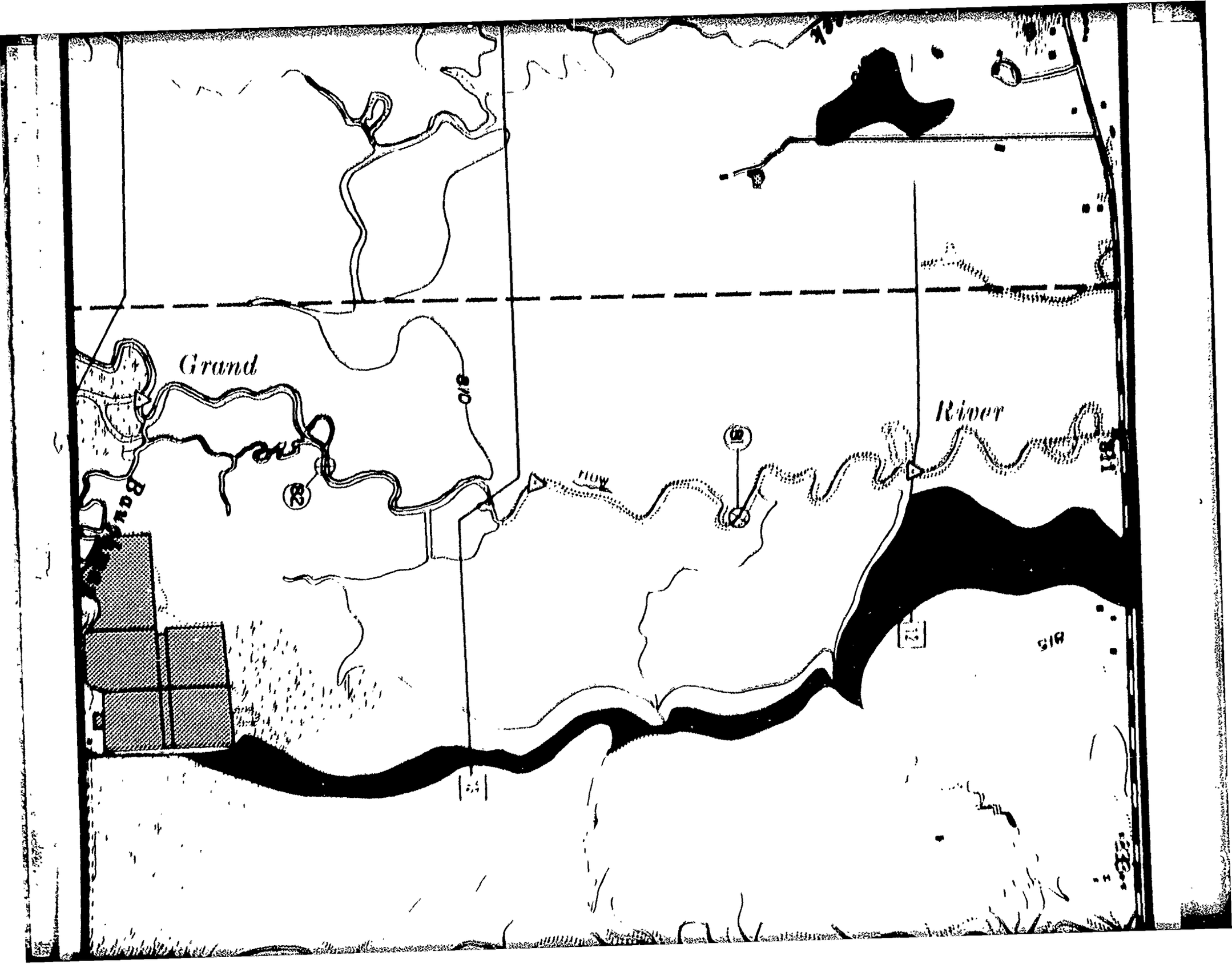
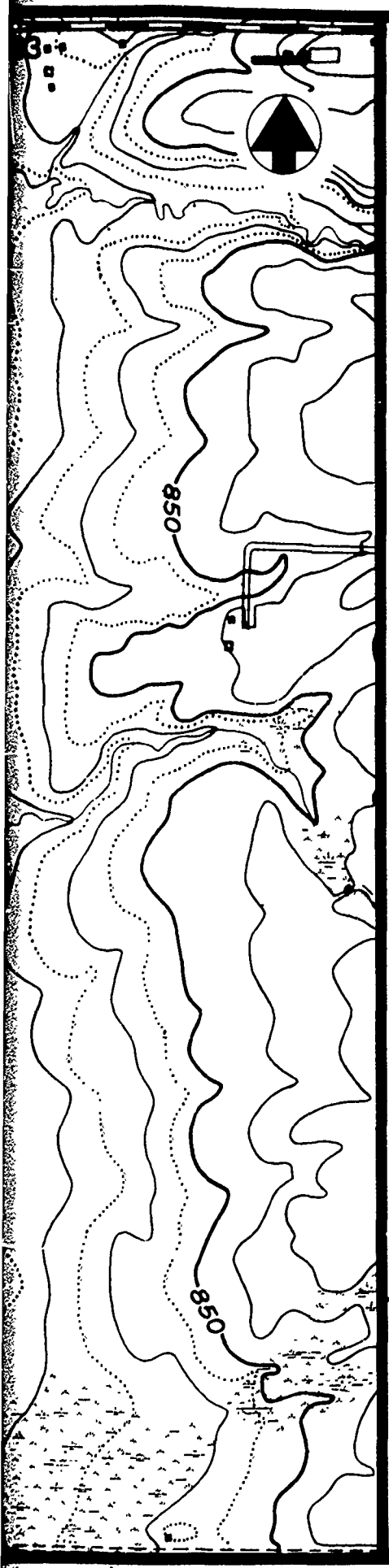
Coffee
Creek
810
815
820
BRIGDEN RD
Creek
Creek
14


Grand
River



LEGEND

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

(81) DISTANCE FROM MOUTH IN MILES

△ HALF MILE POINTS

[13] LOCATION OF VALLEY CROSS SECTION

CONTOUR INTERVAL 10 FEET. DOTTED LINES REPRESENT HALF-INTERVAL CONTOURS.

LIMITS OF OVERFLOW INDICATED MAY VARY SOME FROM ACTUAL LOCATIONS ON GROUND AS EXPLAINED IN THIS REPORT.

0 1000 2000

SCALE IN FEET

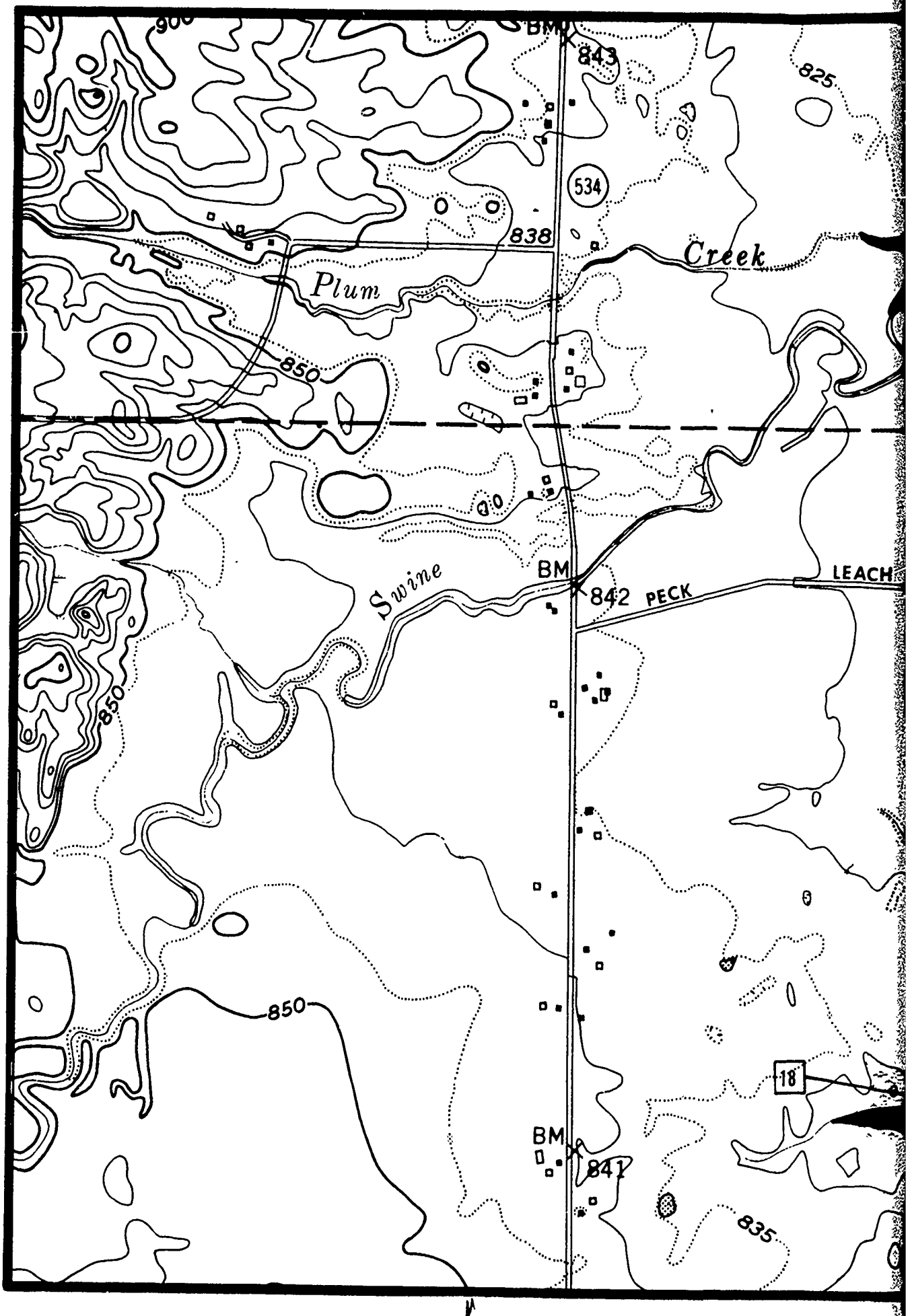
GRAND RIVER
TRUMBULL COUNTY, OHIO

FLOOD PLAIN INFORMATION REPORT

FLOODED AREA MAP
MILE 80.02 TO 82.77

U.S. ARMY ENGINEER DISTRICT, BUFFALO
JULY 1975

PLATE 5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BM
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Creek
Plum
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BM
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PECK
LEACH
Swine
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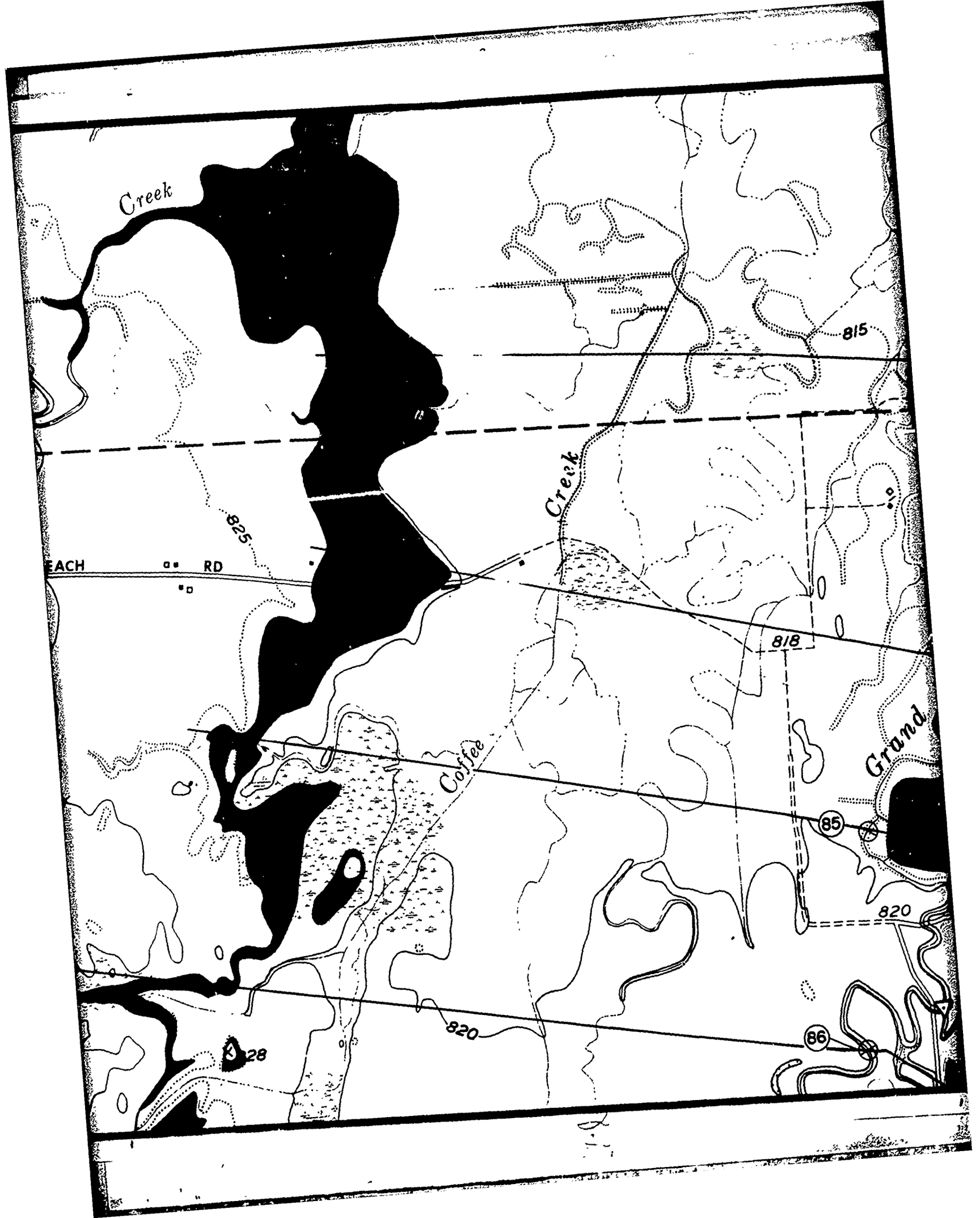
850
18
BM
841
835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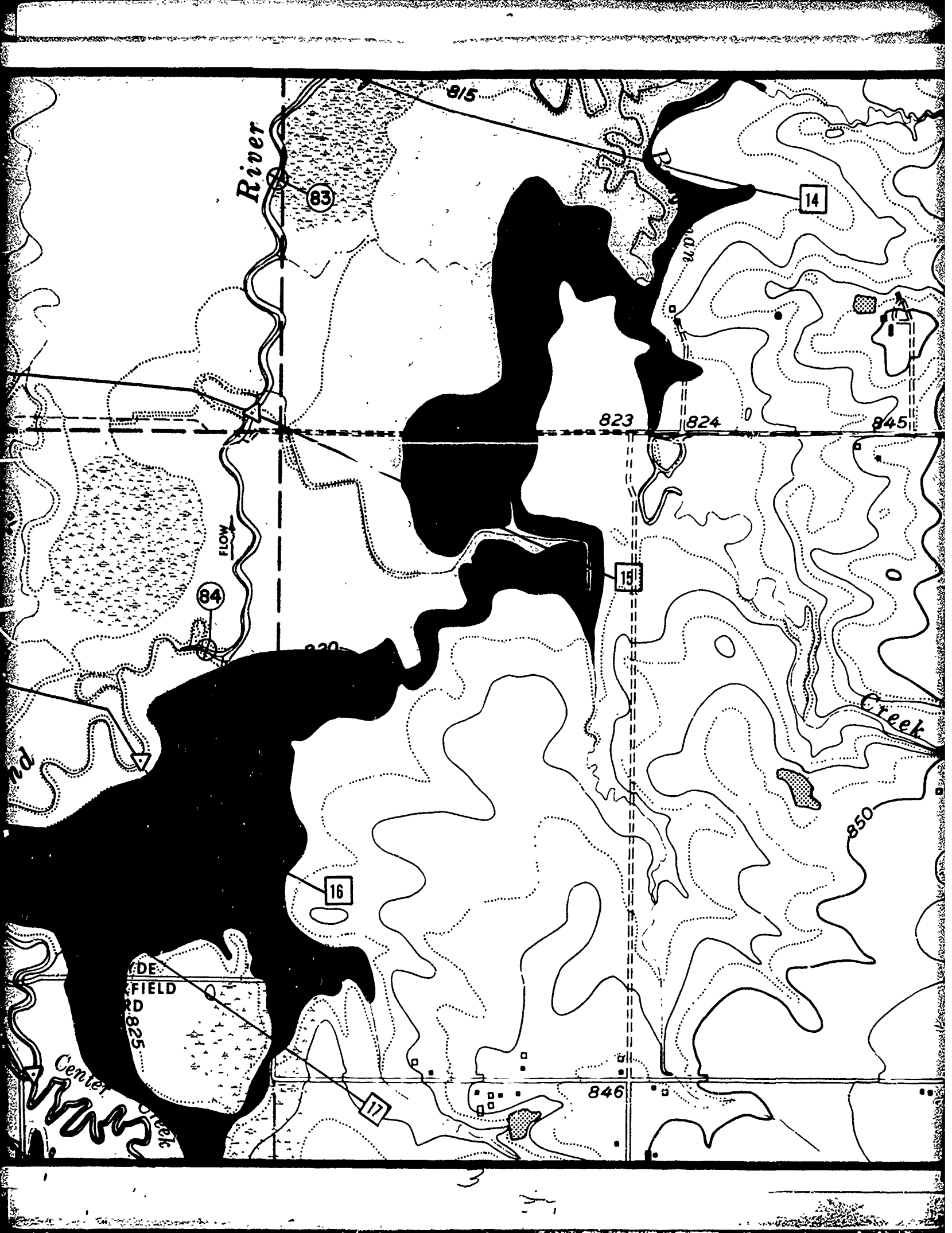
815
Creek
825
EACH
RD
818
Coffee
Grand
85
820
820
86
28


River
815
83
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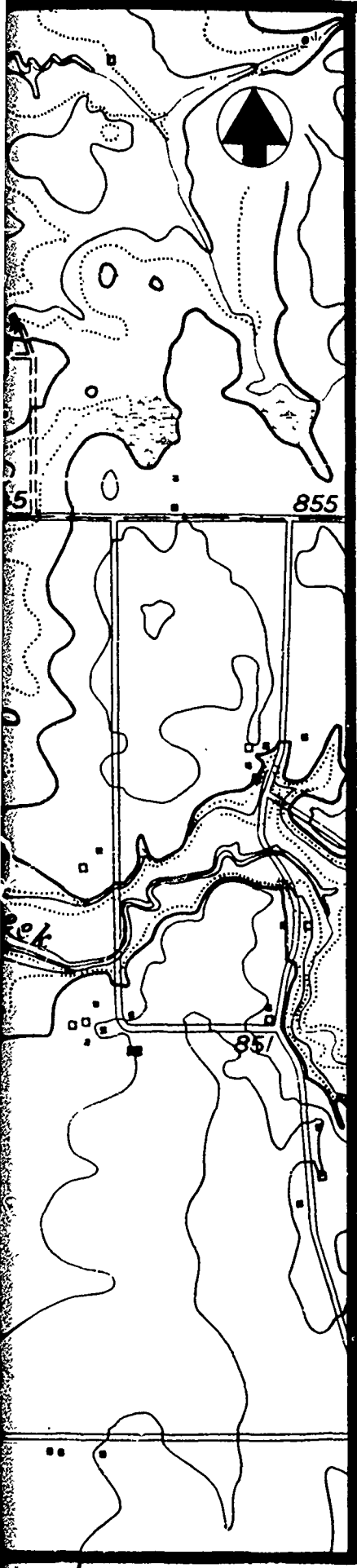
823
824
845
FLOW
84
15
Creek
850
16
DE
FIELD
RD
825
846
17



LEGEND

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

(84) DISTANCE FROM MOUTH IN MILES

△ HALF MILE POINTS

[18] LOCATION OF VALLEY CROSS SECTION

CONTOUR INTERVAL 10 FEET.
DOTTED LINES REPRESENT HALF-INTERVAL CONTOURS.

LIMITS OF OVERFLOW INDICATED MAY VARY SOME FROM ACTUAL LOCATIONS ON GROUND AS EXPLAINED IN THIS REPORT.

0 1000 2000

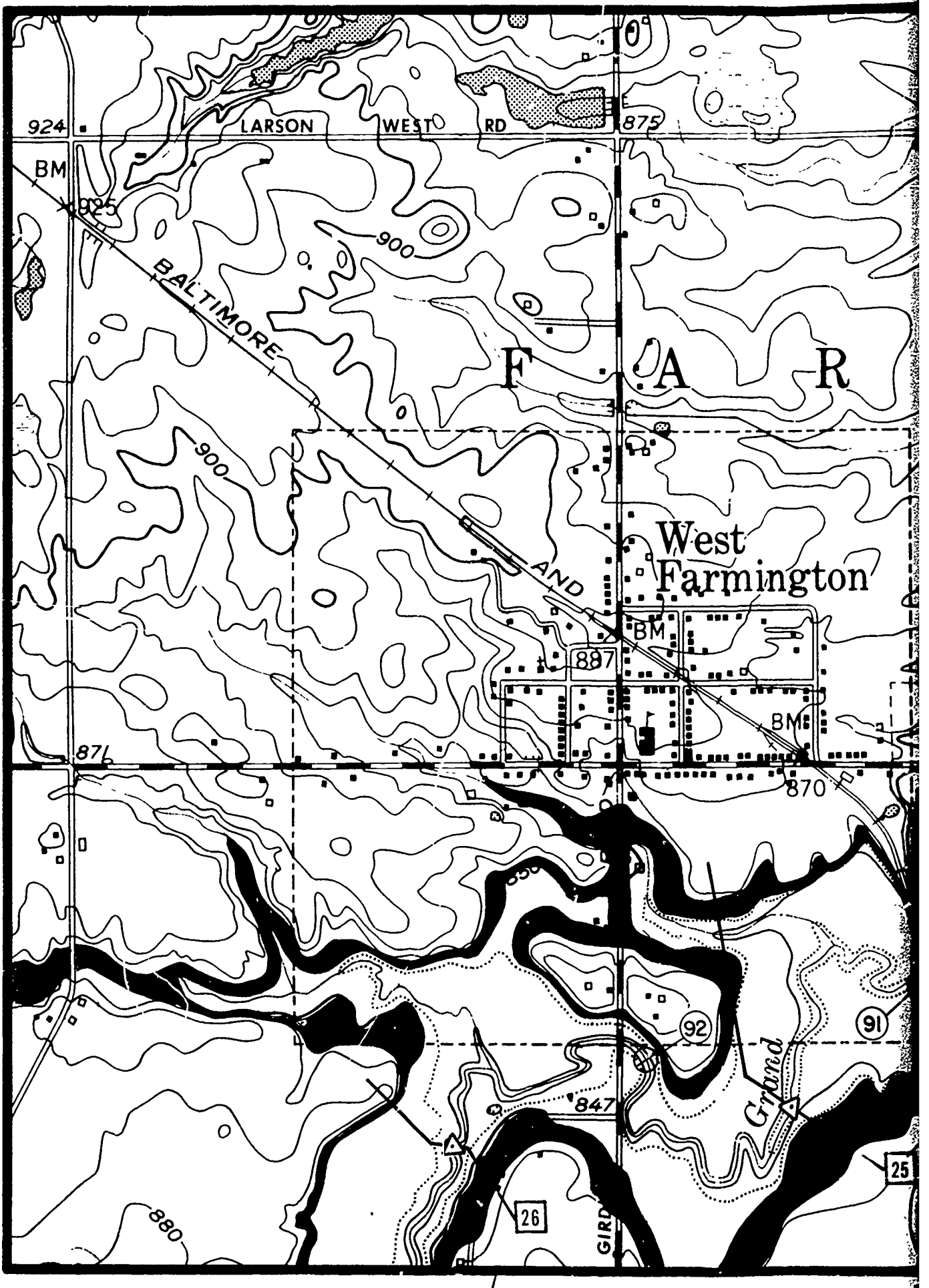
SCALE IN FEET

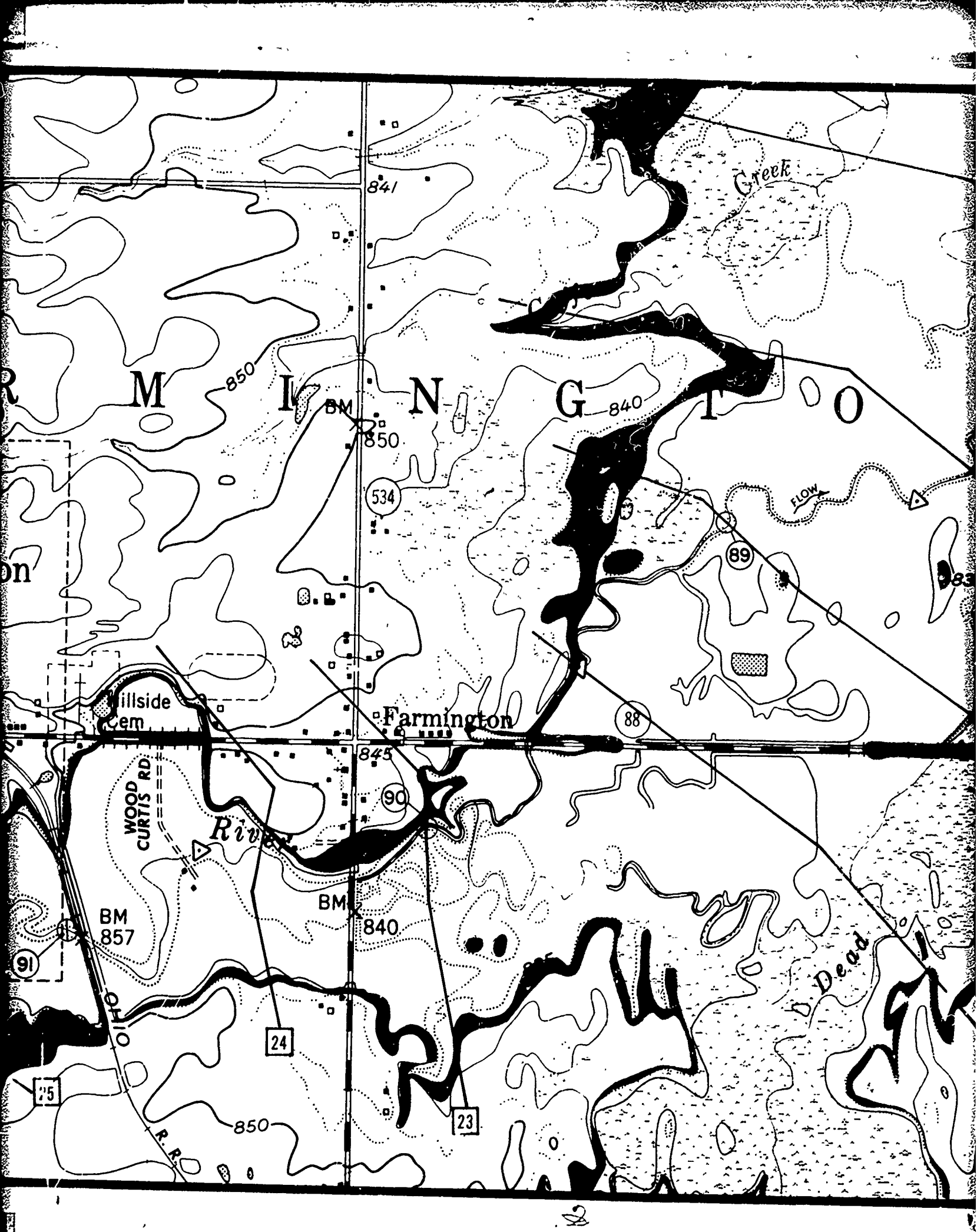
GRAND RIVER
TRUMBULL COUNTY, OHIO

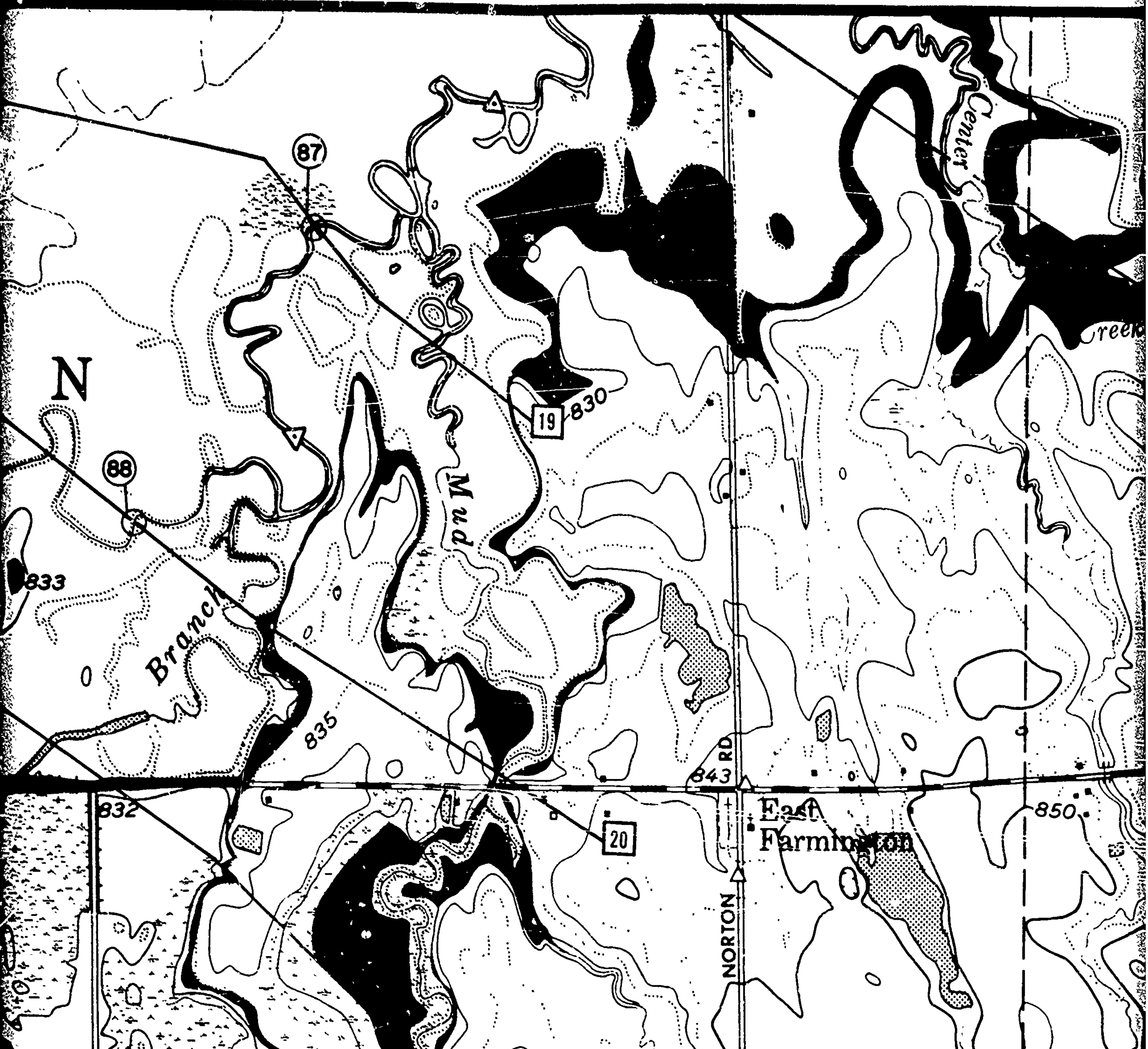
FLOOD PLAIN INFORMATION REPORT

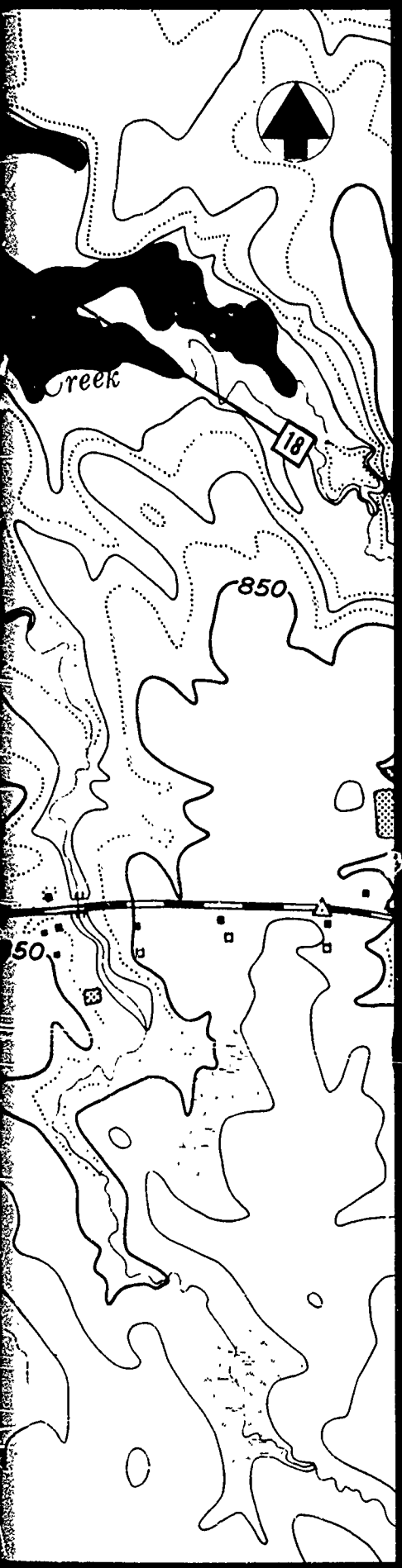
FLOODED AREA MAP
MILE 82.77 TO 86.16

U.S. ARMY ENGINEER DISTRICT, BUFFALO
JULY 1975


924
LARSON
WEST
RD
875
BM
925
900
BALTIMORE
AND
F
A
R
900
West
Farmington
BM
887
BM
871
870
850
92
91
847
Grand
25
26
880
GIRD


Creek
841
M
I
N
G
T
O
850
BM
850
840
534
FLOW
89
Farmington
88
Hillside
Cem
845
WOOD
CURTIS RD
90
BM
857
BM
840
91
OHIO
24
23
25
850
R.R.
Dead


N
87
88
19
20
21
22
830
833
835
832
843
850
840
850
Mud
Branch
Run
Center
NORTON
RD
HOFFMAN
East
STROUPS
HICKOX
RD



LEGEND

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

88 DISTANCE FROM MOUTH IN MILES

HALF MILE POINT

24 LOCATION OF VALLEY CROSS SECTION

CONTOUR INTERVAL 10 FEET. DOTTED LINES REPRESENT HALF-INTERVAL CONTOURS

LIMITS OF OVERFLOW INDICATED MAY VARY SOME FROM ACTUAL LOCATIONS ON GROUND AS EXPLAINED IN THIS REPORT.

0 1000 2000

SCALE IN FEET

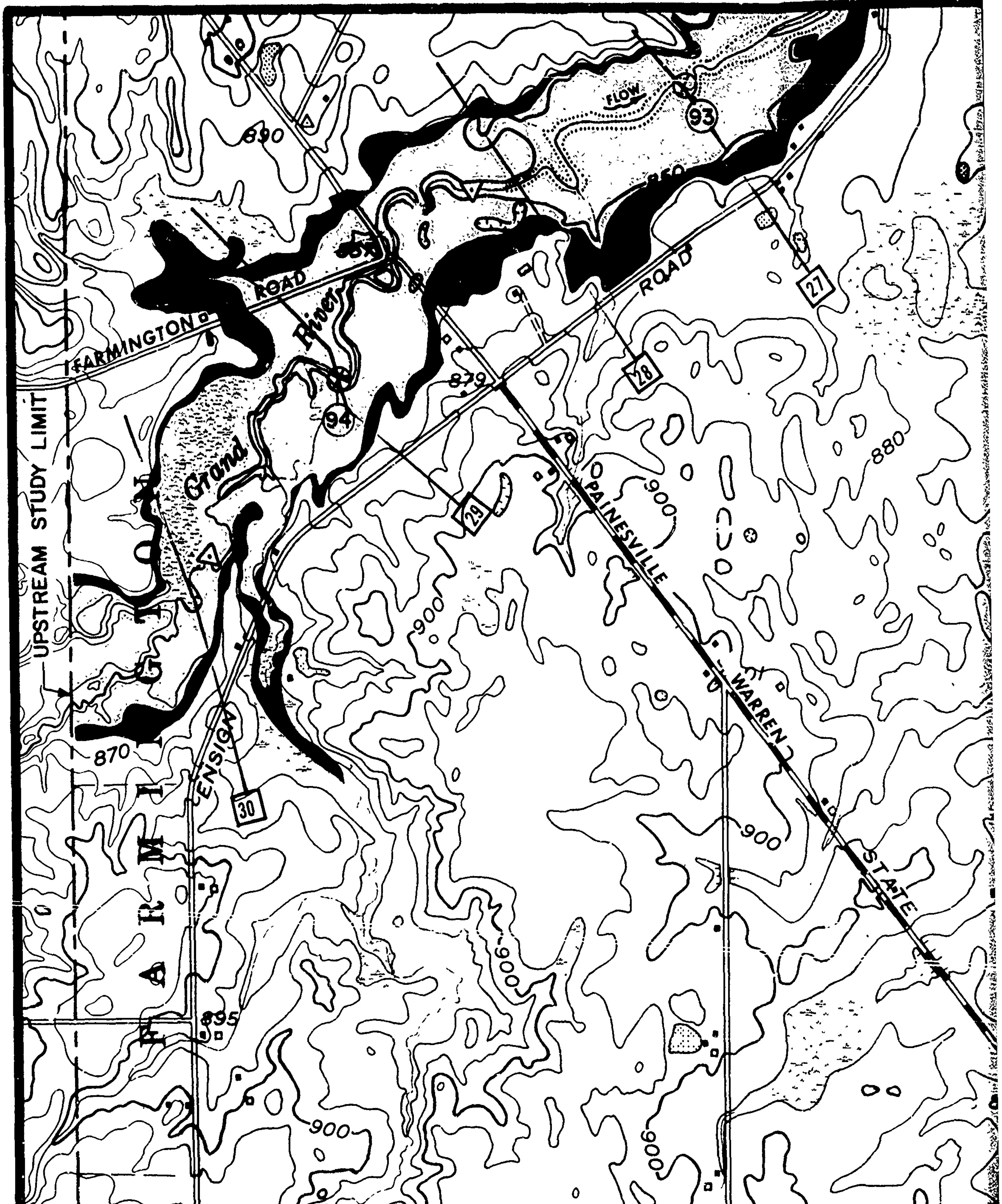
GRAND RIVER
TRUMBULL COUNTY, OHIO

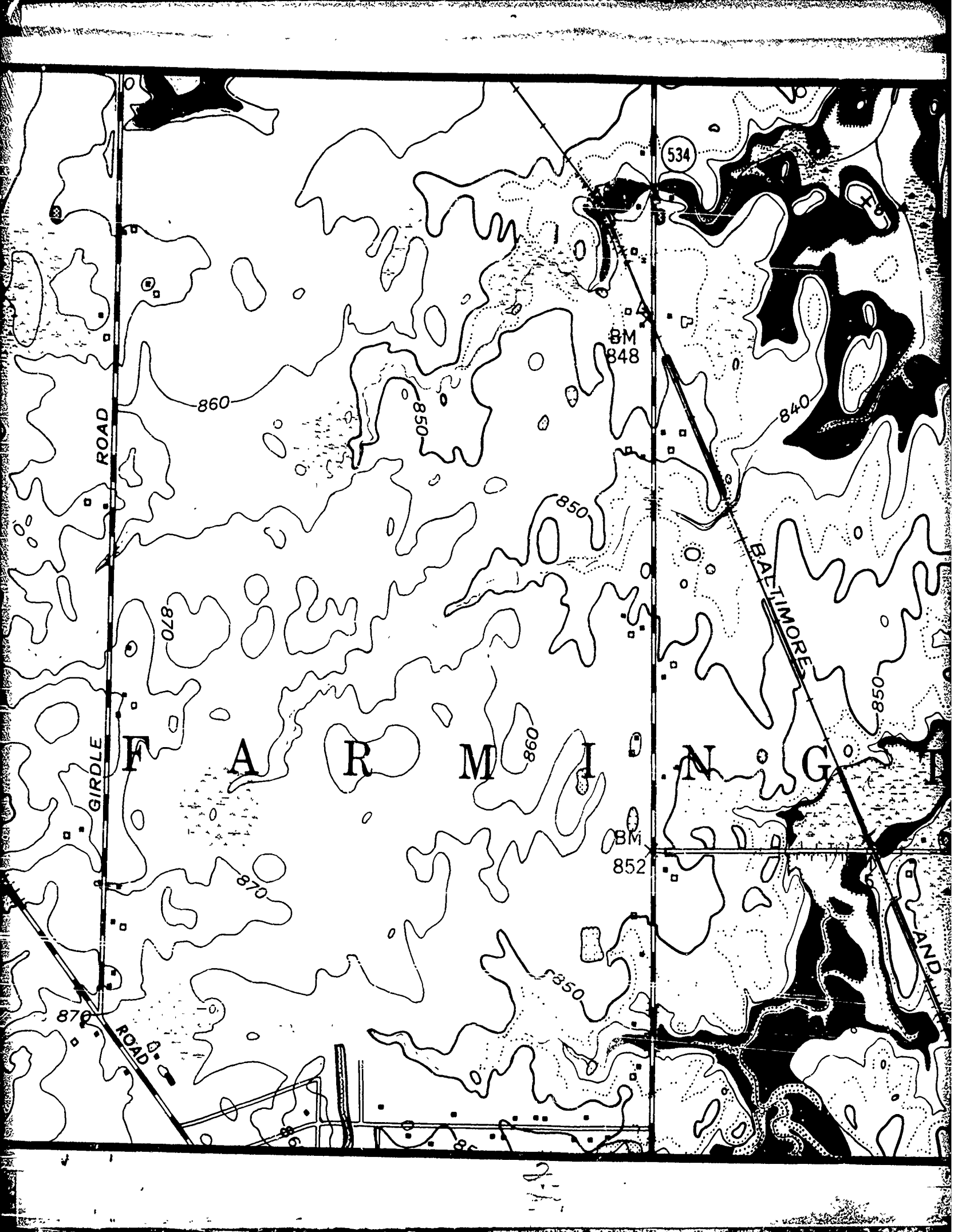
FLOOD PLAIN INFORMATION REPORT

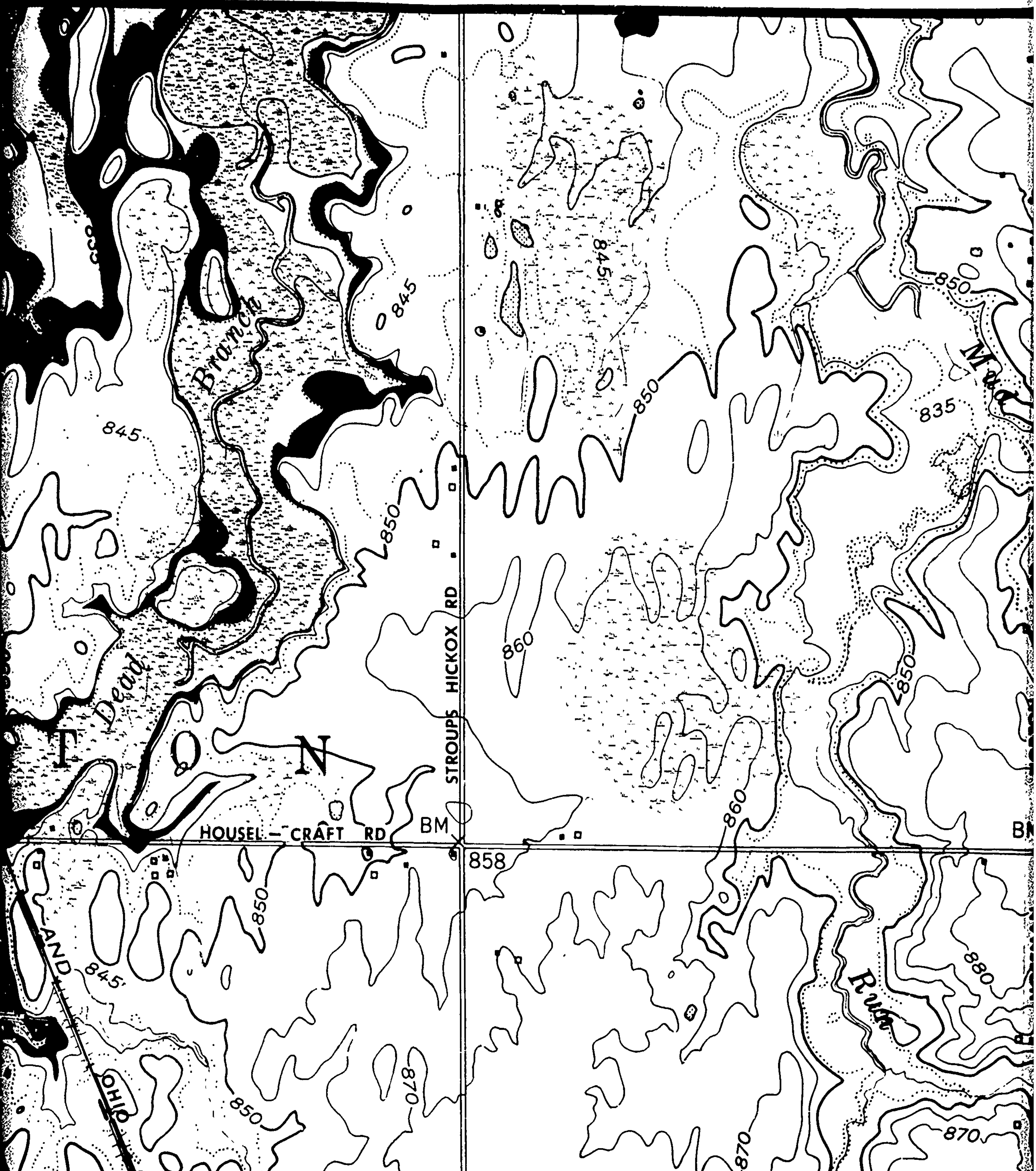
FLOODED AREA MAP
MILE 86.16 TO 92.72

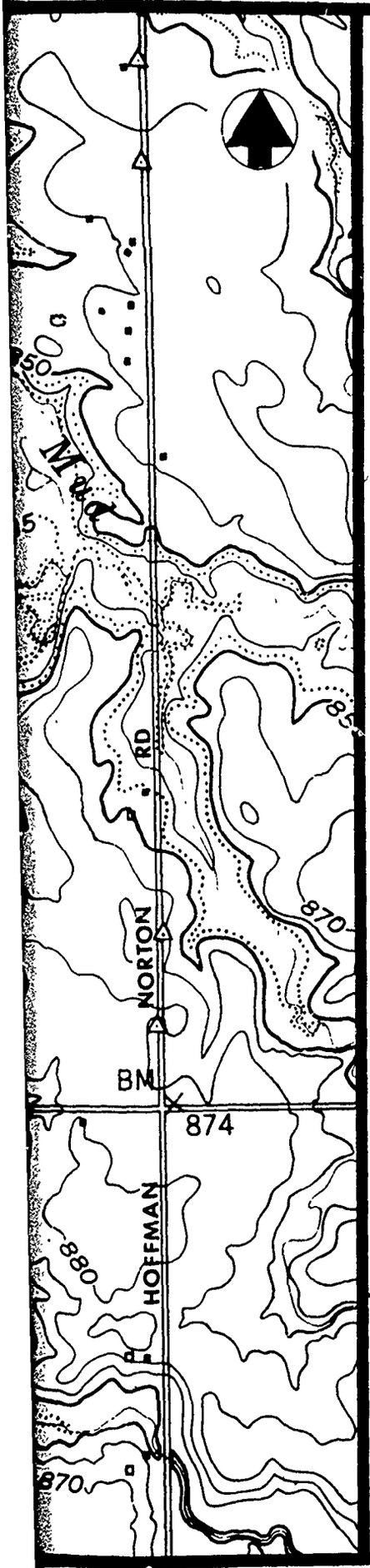
U.S. ARMY ENGINEER DISTRICT, BUFFALO
JULY 1975

PLATE 7


UPSTREAM STUDY LIMIT
FARMINGTON ROAD
Grand River
FLOW
PAINESVILLE WARREN STATE ROAD
ENSIGN
FARMINGTON
93
94
27
28
29
30
890
850
879
880
900
870
895


534
BM
848
860
850
840
ROAD
850
870
BALTIMORE
850
F A R M I N G T
860
GIRDLE
BM
852
870
850
870
ROAD


Branch
Dead
T O N
Mud
Run
STROUPS HICKOX RD
HOUSEL – CRAFT RD
BM
858
BM
AND
OHIO
845
845
845
845
850
850
850
850
850
850
835
860
860
870
870
870
880



LEGEND

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

(94) DISTANCE FROM MOUTH IN MILES

△ HALF MILE POINTS

[27] LOCATION OF VALLEY CROSS SECTION

CONTOUR INTERVAL 10 FEET.
DOTTED LINES REPRESENT HALF-INTERVAL CONTOURS.

LIMITS OF OVERFLOW INDICATED MAY VARY SOME FROM ACTUAL LOCATIONS ON GROUND AS EXPLAINED IN THIS REPORT.

0 1000 2000
SCALE IN FEET

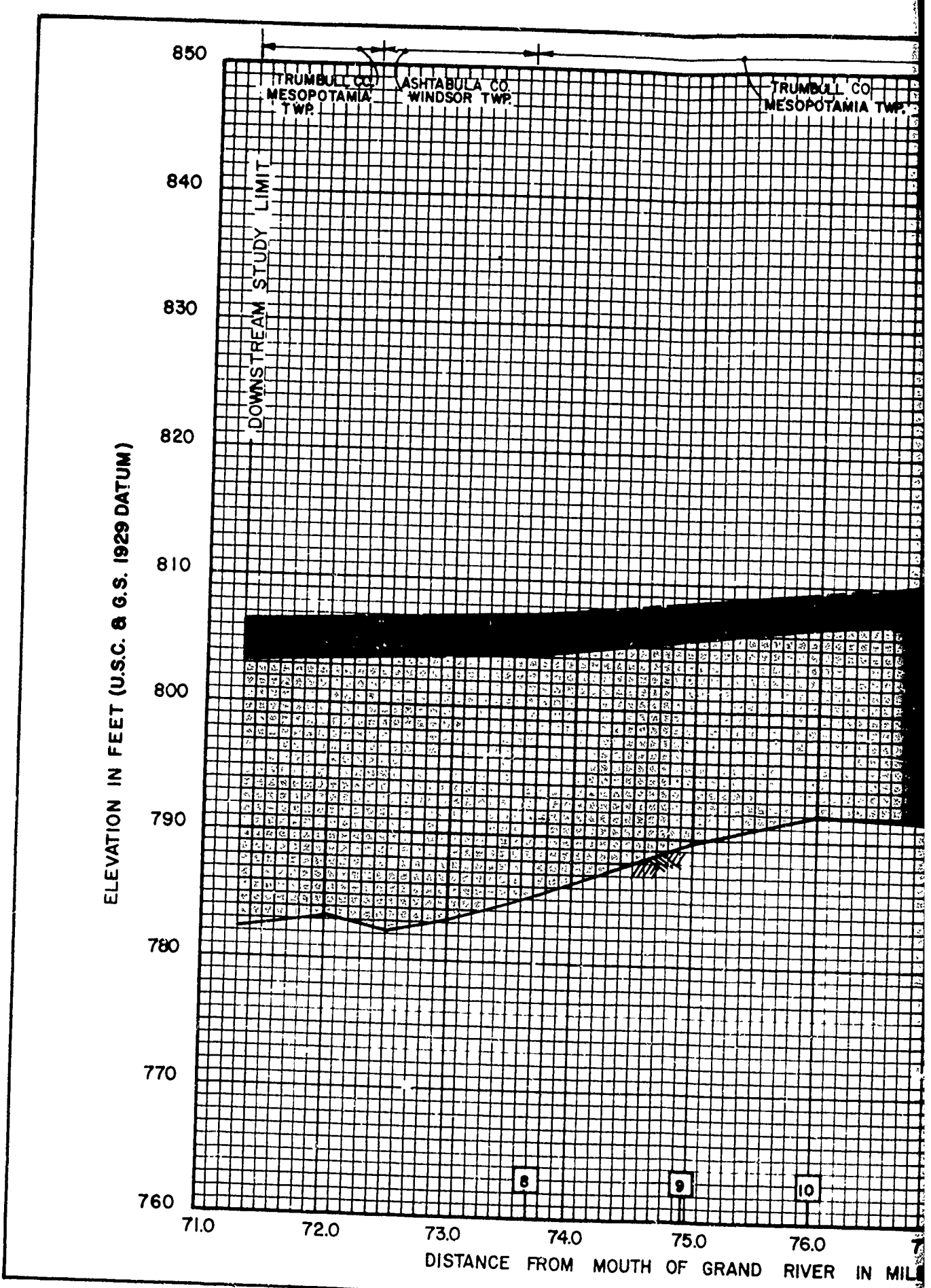
GRAND RIVER
TRUMBULL COUNTY, OHIO

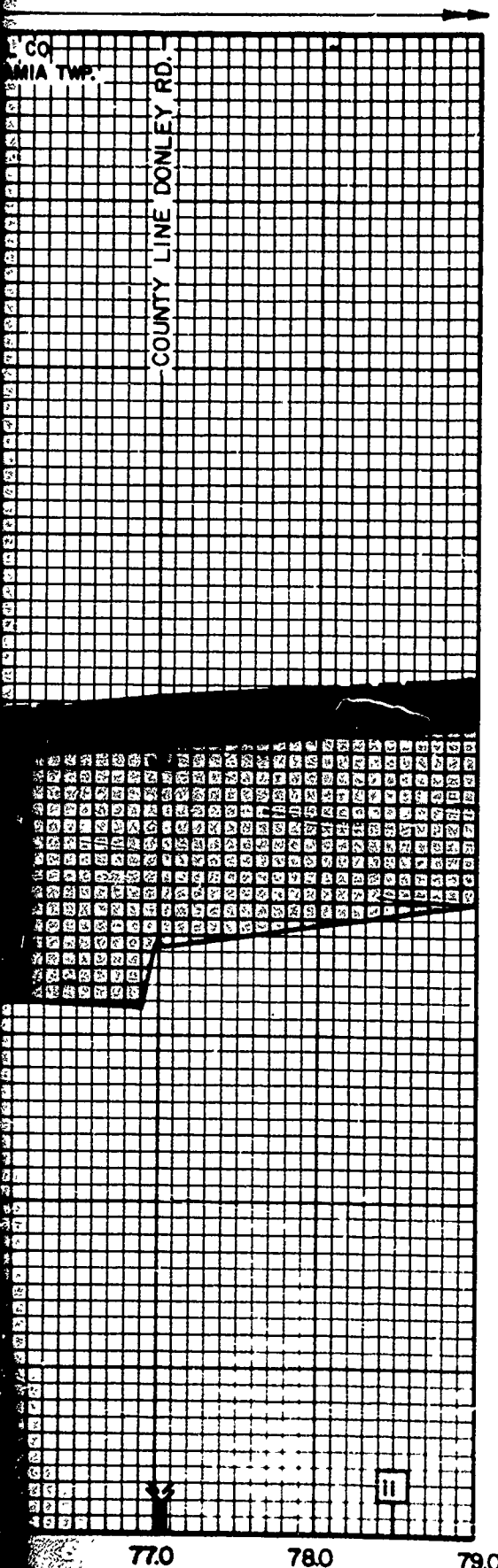
FLOOD PLAIN INFORMATION REPORT

FLOODED AREA MAP
MILE 92.72 TO 94.90

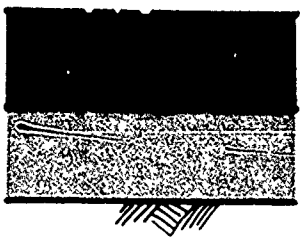
U.S. ARMY ENGINEER DISTRICT, BUFFALO
JULY 1975

PLATE 8


TRUMBULL CO.
MESOPOTAMIA
TWP.
ASHTABULA CO.
WINDSOR TWP.
TRUMBULL CO.
MESOPOTAMIA TWP.
DOWNSTREAM STUDY LIMIT
ELEVATION IN FEET (U.S.C. & G.S. 1929 DATUM)
850
840
830
820
810
800
790
780
770
760
8
9
10
71.0
72.0
73.0
74.0
75.0
76.0
DISTANCE FROM MOUTH OF GRAND RIVER IN MIL



LEGEND



STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

STREAM BED

APPROXIMATE BRIDGE FLOOR ELEVATION

APPROXIMATE LOW STEEL ELEVATION

II LOCATION OF VALLEY CROSS SECTION

CROSS SECTION LOCATION

NOTES

FLOOD PROFILES ARE BASED ON THE FOLLOWING:

1. EXISTING CHANNEL CONDITIONS
2. EXISTING STRUCTURES
3. EXISTING CONDITIONS OF DEVELOPMENT

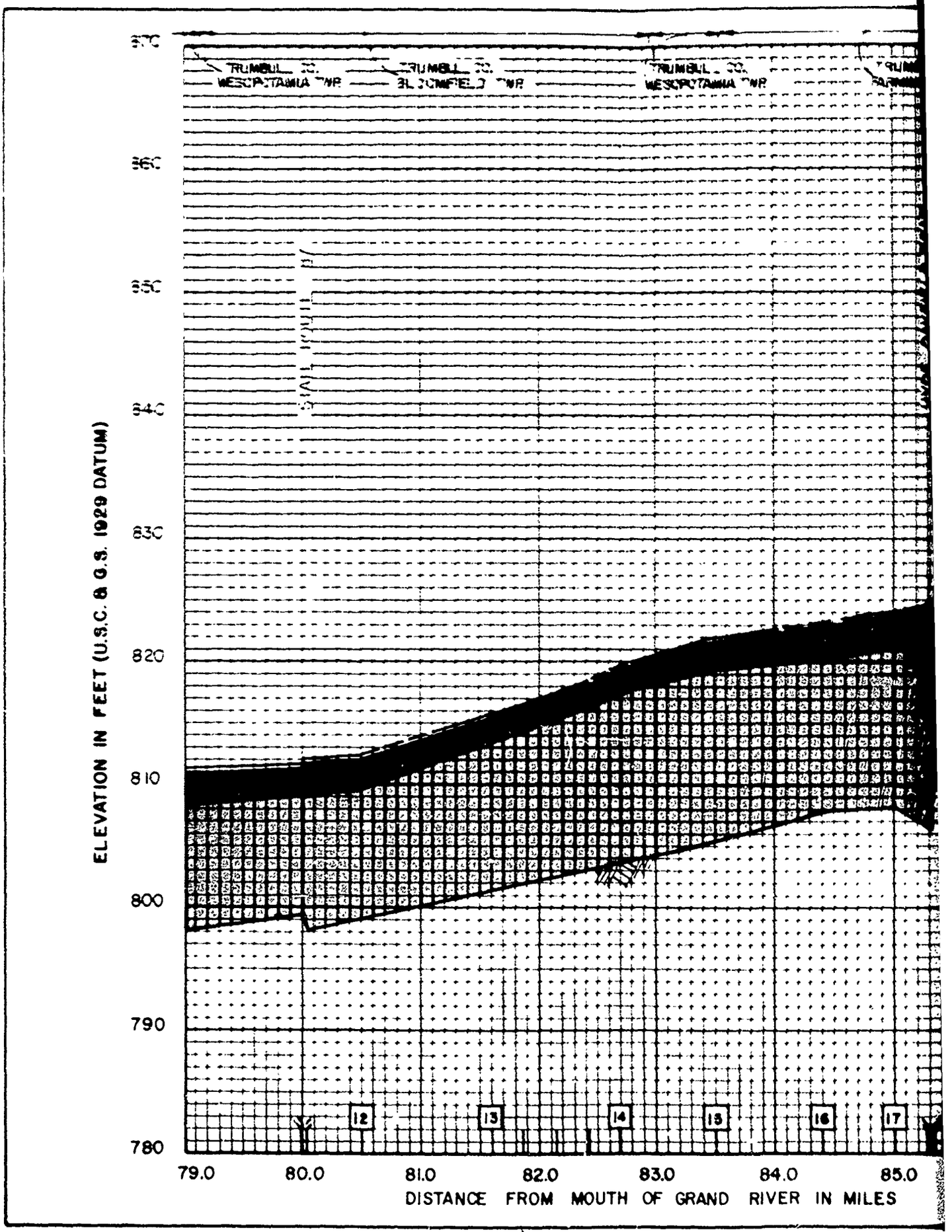
LARGE SCALE FILLING WILL RAISE PROFILES UNLESS SUFFICIENT FLOODWAY IS PROVIDED.

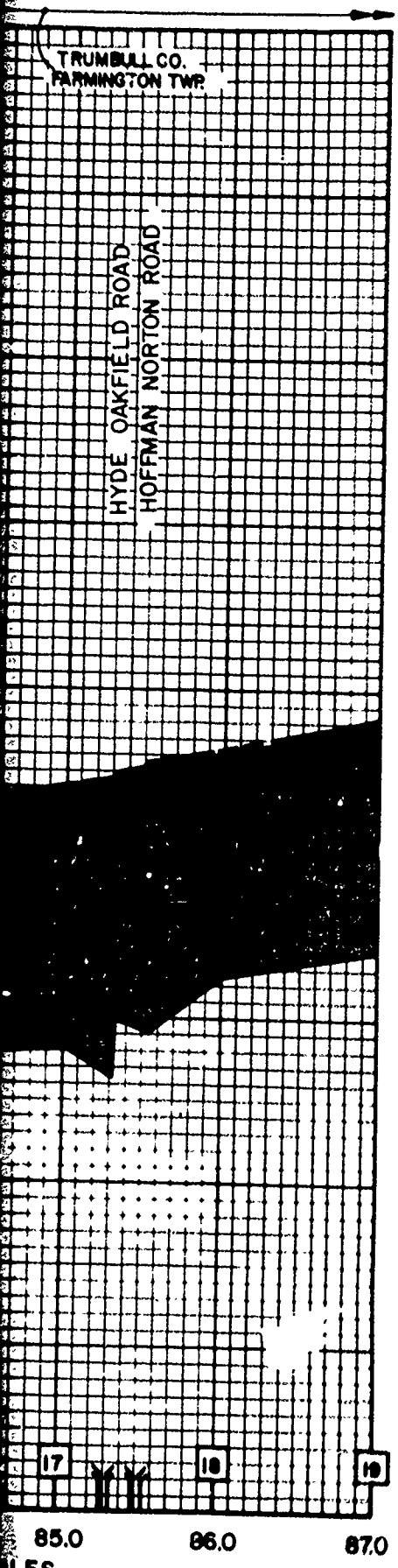
GRAND RIVER
TRUMBULL COUNTY, OHIO
FLOOD PLAIN INFORMATION REPORT

PROFILES
MILE 71.3 TO 79.0

U.S. ARMY ENGINEER DISTRICT, BUFFALO

JULY 1975


TRUMBULL CO.
WESCOTTAMIA TWP
TRUMBULL CO.
BLOOMFIELD TWP
TRUMBULL CO.
WESCOTTAMIA TWP
860
850
840
830
820
810
800
790
780
ELEVATION IN FEET (U.S.C. & G.S. 1929 DATUM)
12
13
14
15
16
17
79.0
80.0
81.0
82.0
83.0
84.0
85.0
DISTANCE FROM MOUTH OF GRAND RIVER IN MILES



LEGEND

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

STREAM BED

APPROXIMATE BRIDGE FLOOR ELEVATION

APPROXIMATE LOW STEEL ELEVATION

15 LOCATION OF VALLEY CROSS SECTION

CROSS SECTION LOCATION

NOTES

FLOOD PROFILES ARE BASED ON THE FOLLOWING:

1. EXISTING CHANNEL CONDITIONS
2. EXISTING STRUCTURES
3. EXISTING CONDITIONS OF DEVELOPMENT

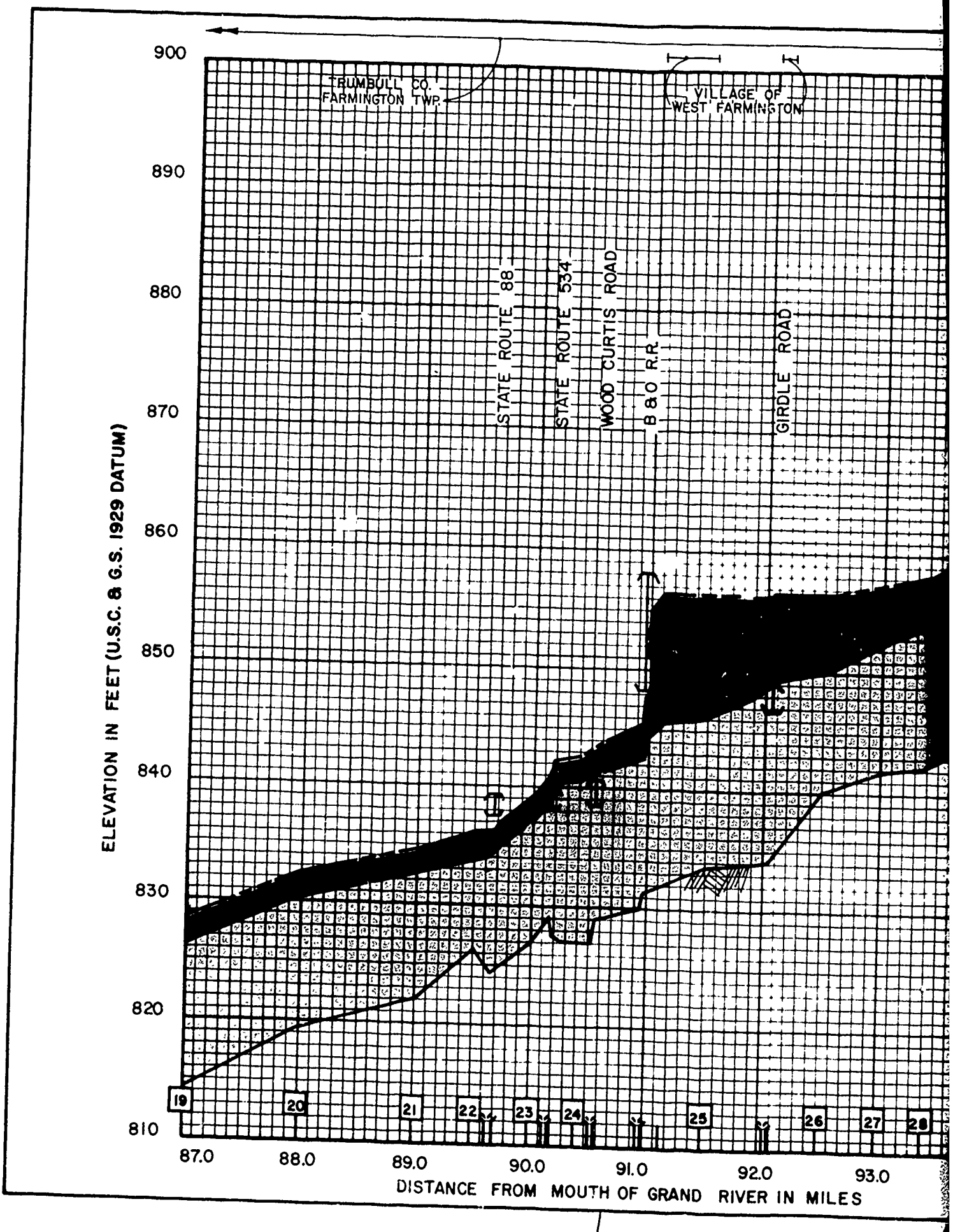
LARGE SCALE FILLING WILL RAISE PROFILES UNLESS SUFFICIENT FLOODWAY IS PROVIDED.

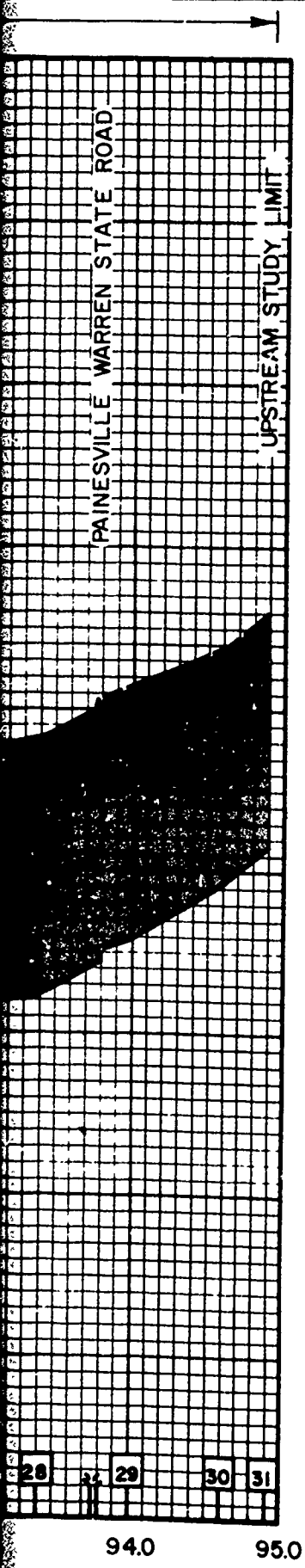
GRAND RIVER
TRUMBULL COUNTY, OHIO
FLOOD PLAIN INFORMATION REPORT
PROFILES
MILE 79.0 TO 87.0

U.S. ARMY ENGINEER DISTRICT, BUFFALO

JULY 1975

PLATE 10


TRUMBULL CO.
FARMINGTON TWP.
VILLAGE OF
WEST FARMINGTON
STATE ROUTE 88
STATE ROUTE 534
WOOD CURTIS ROAD
B & O R.R.
GIRDLE ROAD
ELEVATION IN FEET (U.S.C. & G.S. 1929 DATUM)
900
890
880
870
860
850
840
830
820
810
19
20
21
22
23
24
25
26
27
28
87.0
88.0
89.0
90.0
91.0
92.0
93.0
DISTANCE FROM MOUTH OF GRAND RIVER IN MILES



LEGEND

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

STREAM BED

APPROXIMATE BRIDGE FLOOR ELEVATION

APPROXIMATE LOW STEEL ELEVATION

28 LOCATION OF VALLEY CROSS SECTION

CROSS SECTION LOCATION

NOTES

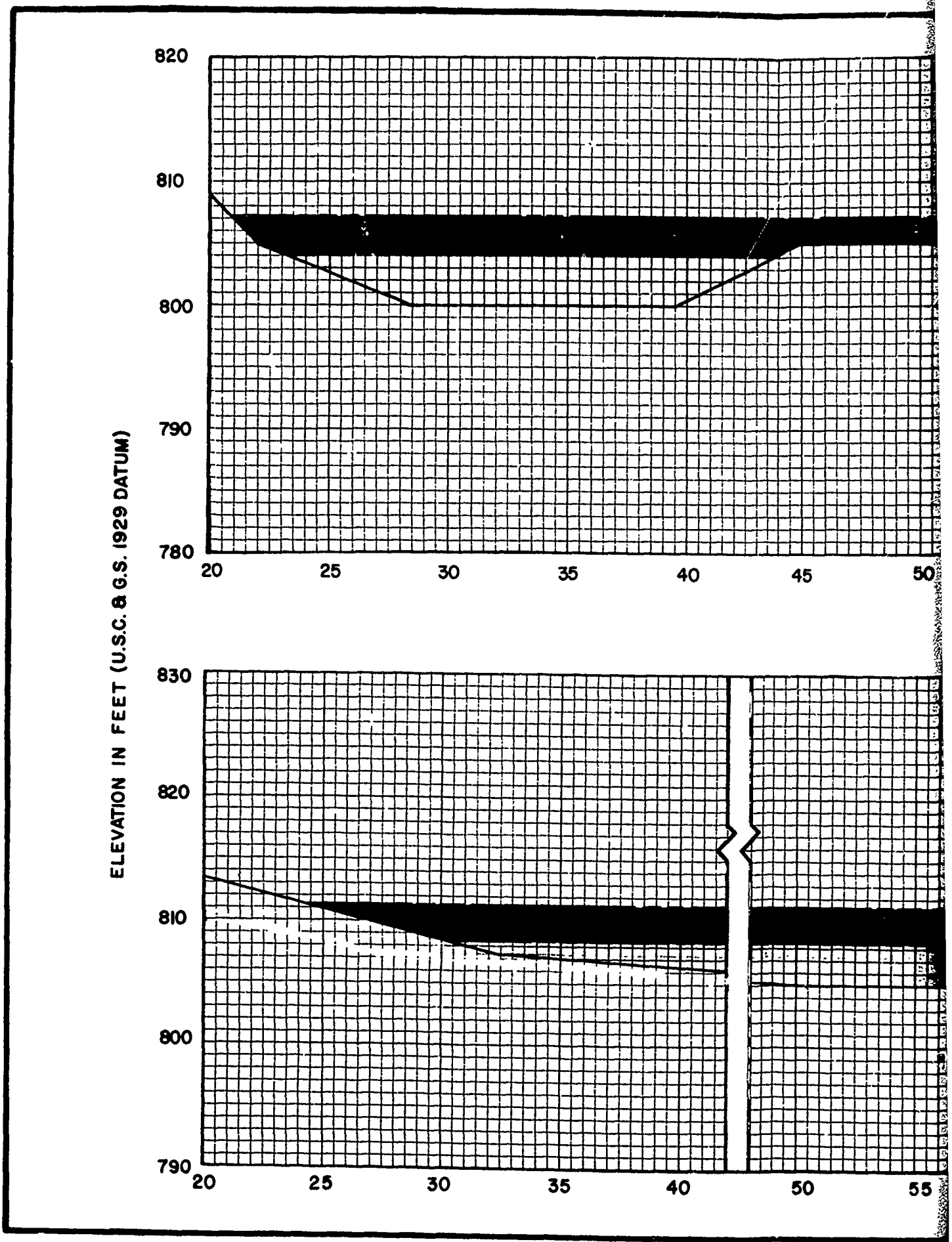
FLOOD PROFILES ARE BASED ON THE FOLLOWING
1. EXISTING CHANNEL CONDITIONS
2. EXISTING STRUCTURES
3. EXISTING CONDITIONS OF DEVELOPMENT

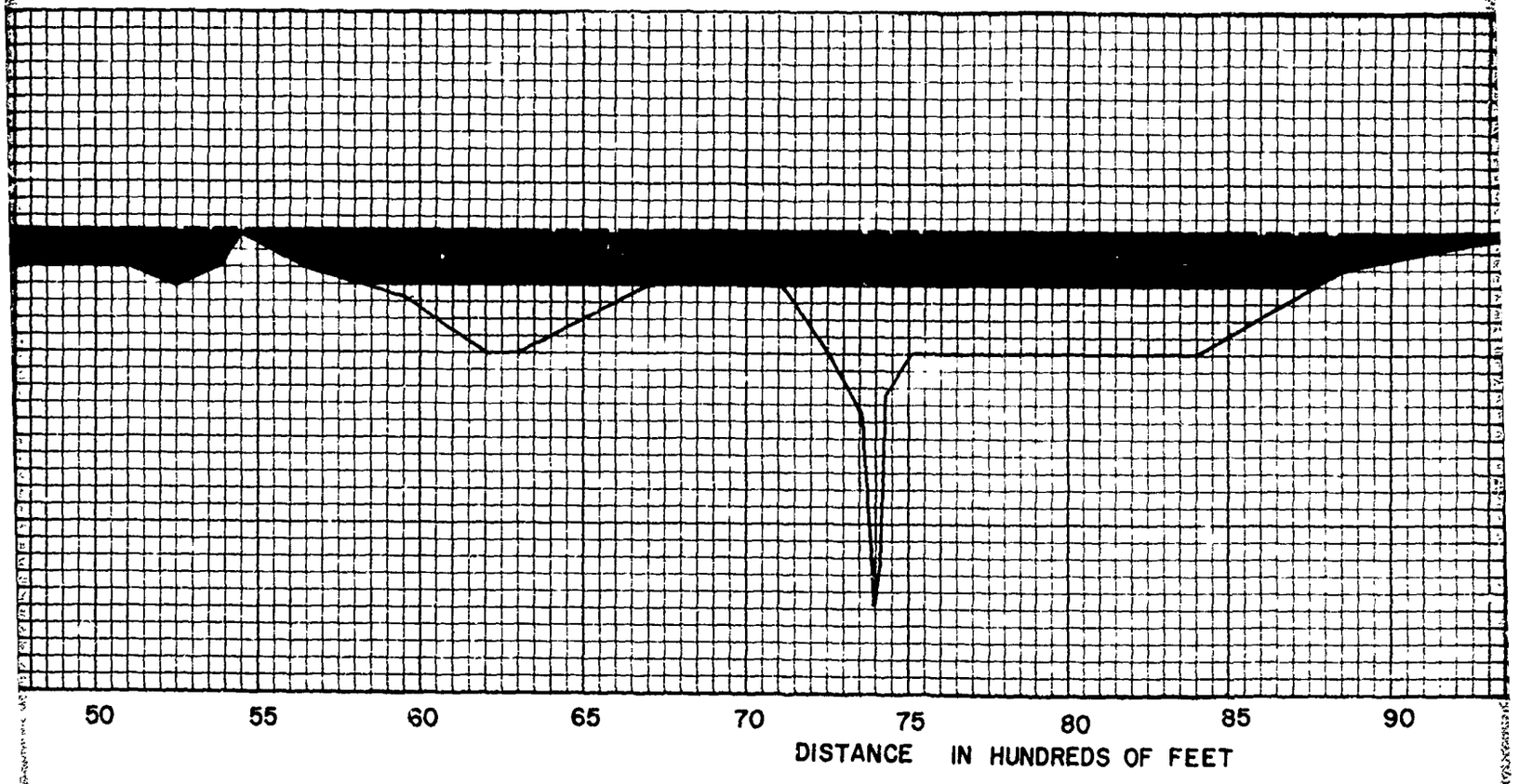
LARGE SCALE FILLING WILL RAISE PROFILES UNLESS SUFFICIENT FLOODWAY IS PROVIDED.

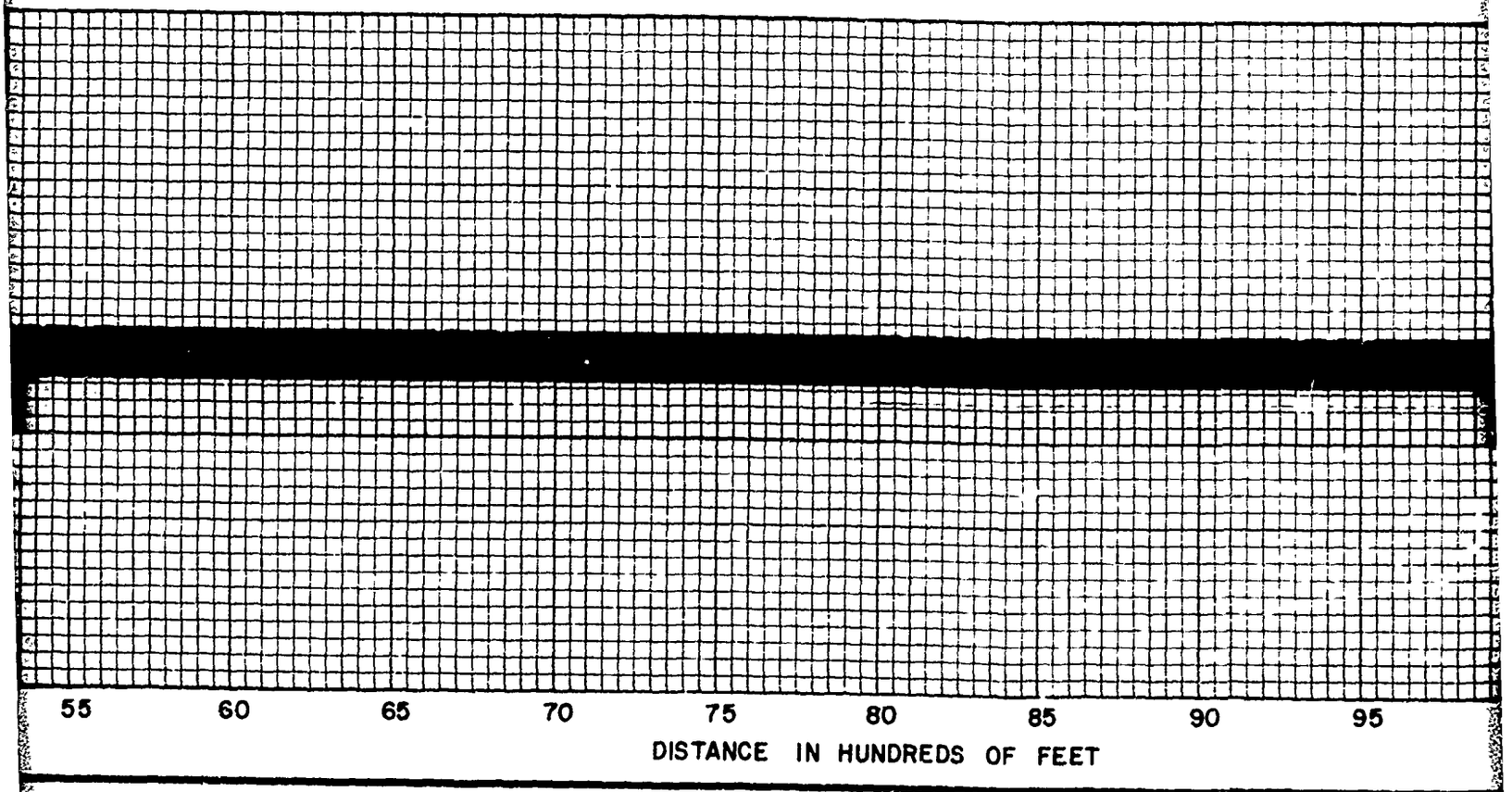
GRAND RIVER
TRUMBULL COUNTY, OHIO
FLOOD PLAIN INFORMATION REPORT
PROFILES
MILE 87.0 TO 94.9

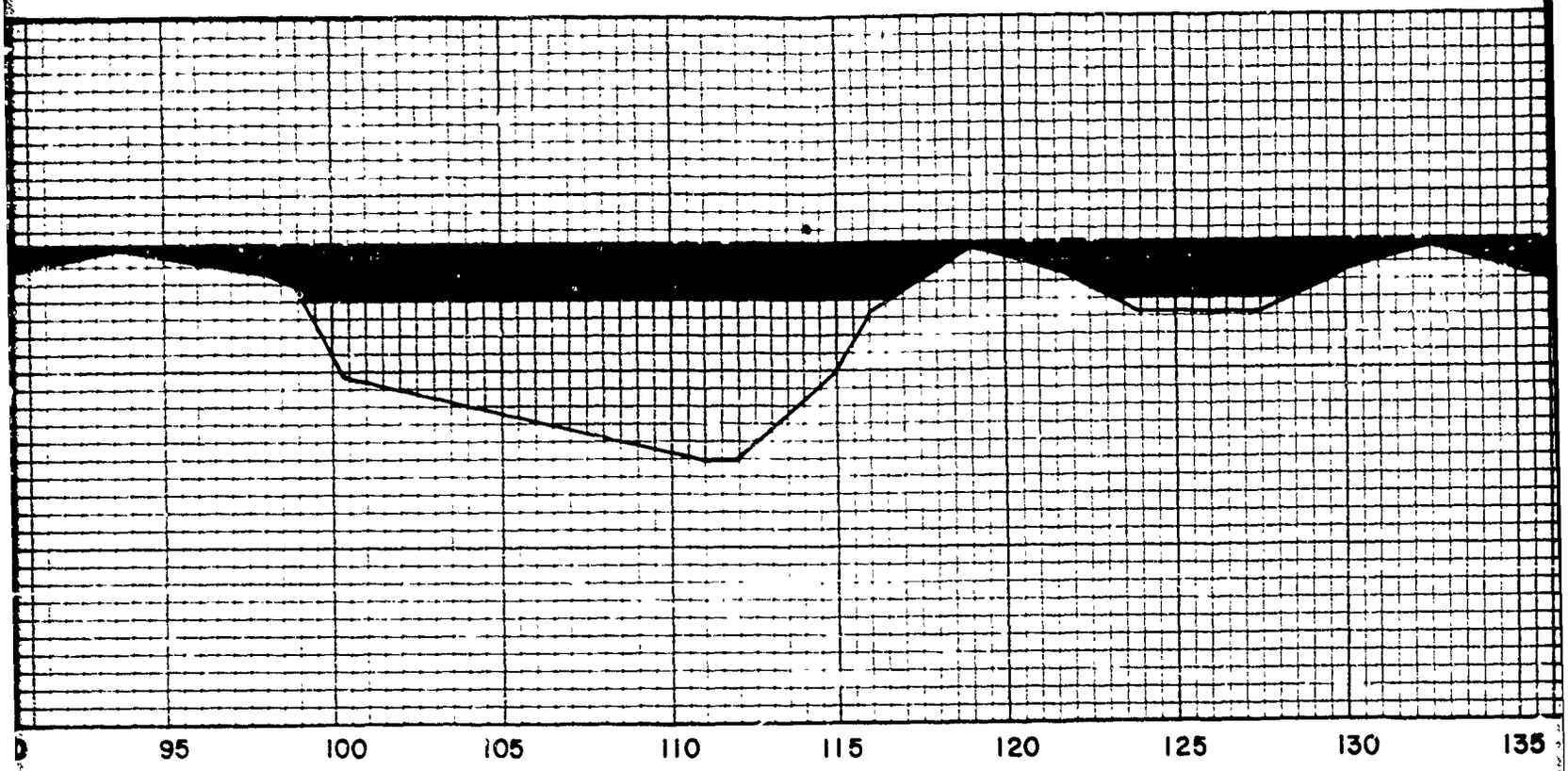
U.S. ARMY ENGINEER DISTRICT, BUFFALO

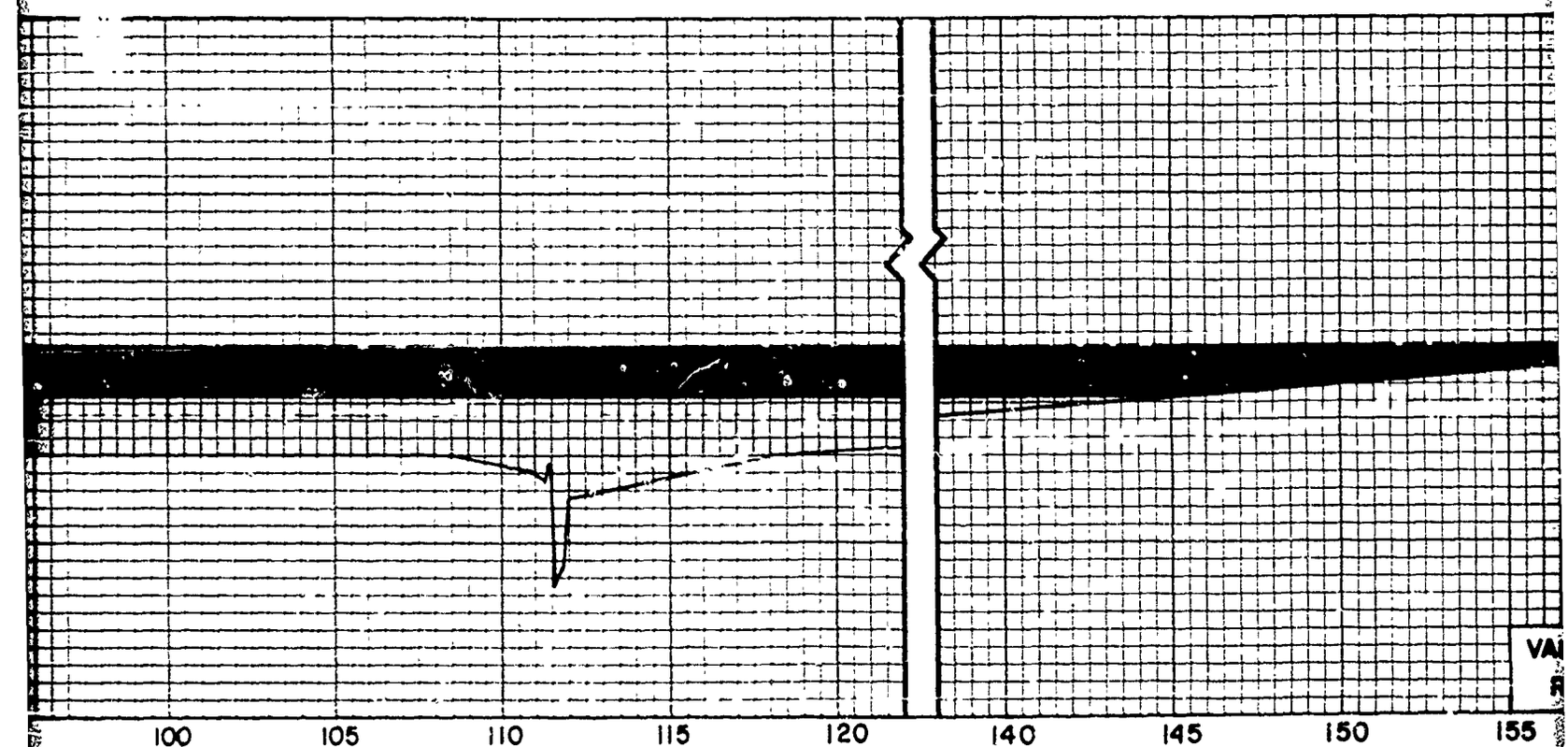
JULY 1975

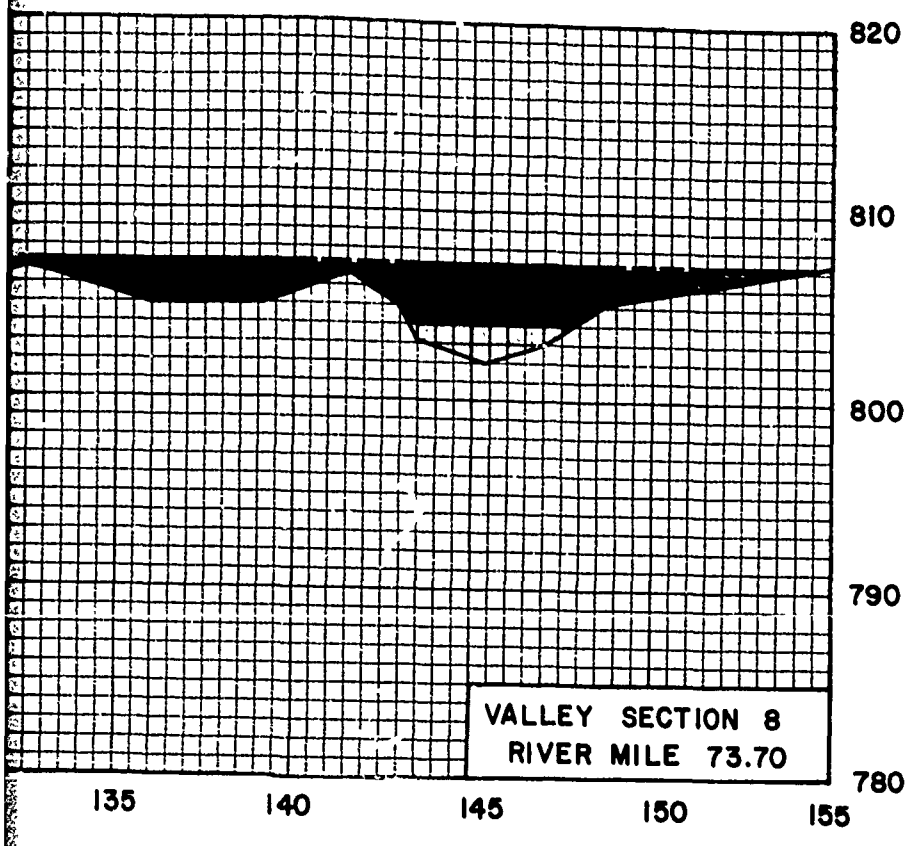

820
810
800
790
780
20
25
30
35
40
45
50
ELEVATION IN FEET (U.S.C. & G.S. 1929 DATUM)
830
820
810
800
790
20
25
30
35
40
50
55

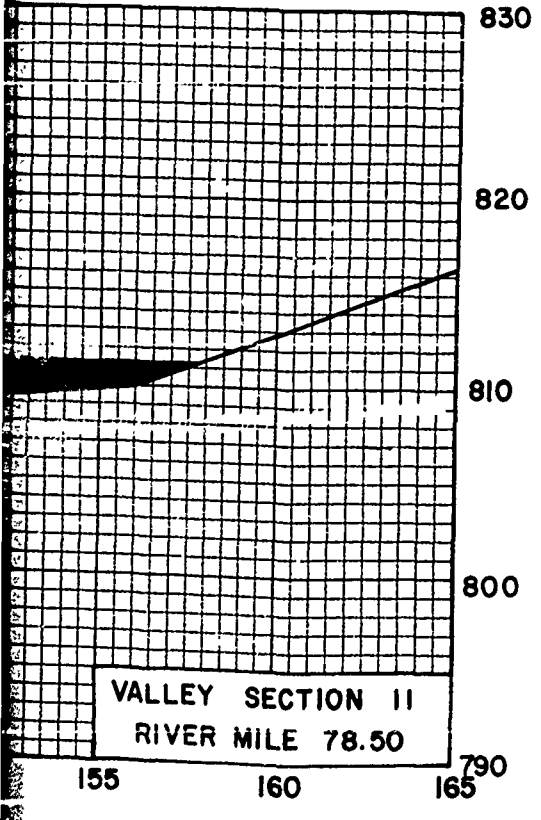

50
55
60
65
70
75
80
85
90
DISTANCE IN HUNDREDS OF FEET


55
60
65
70
75
80
85
90
95
DISTANCE IN HUNDREDS OF FEET


95
100
105
110
115
120
125
130
135


100
105
110
115
120
140
145
150
155





LEGEND

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

APPROXIMATE GROUND SURFACE

NOTES

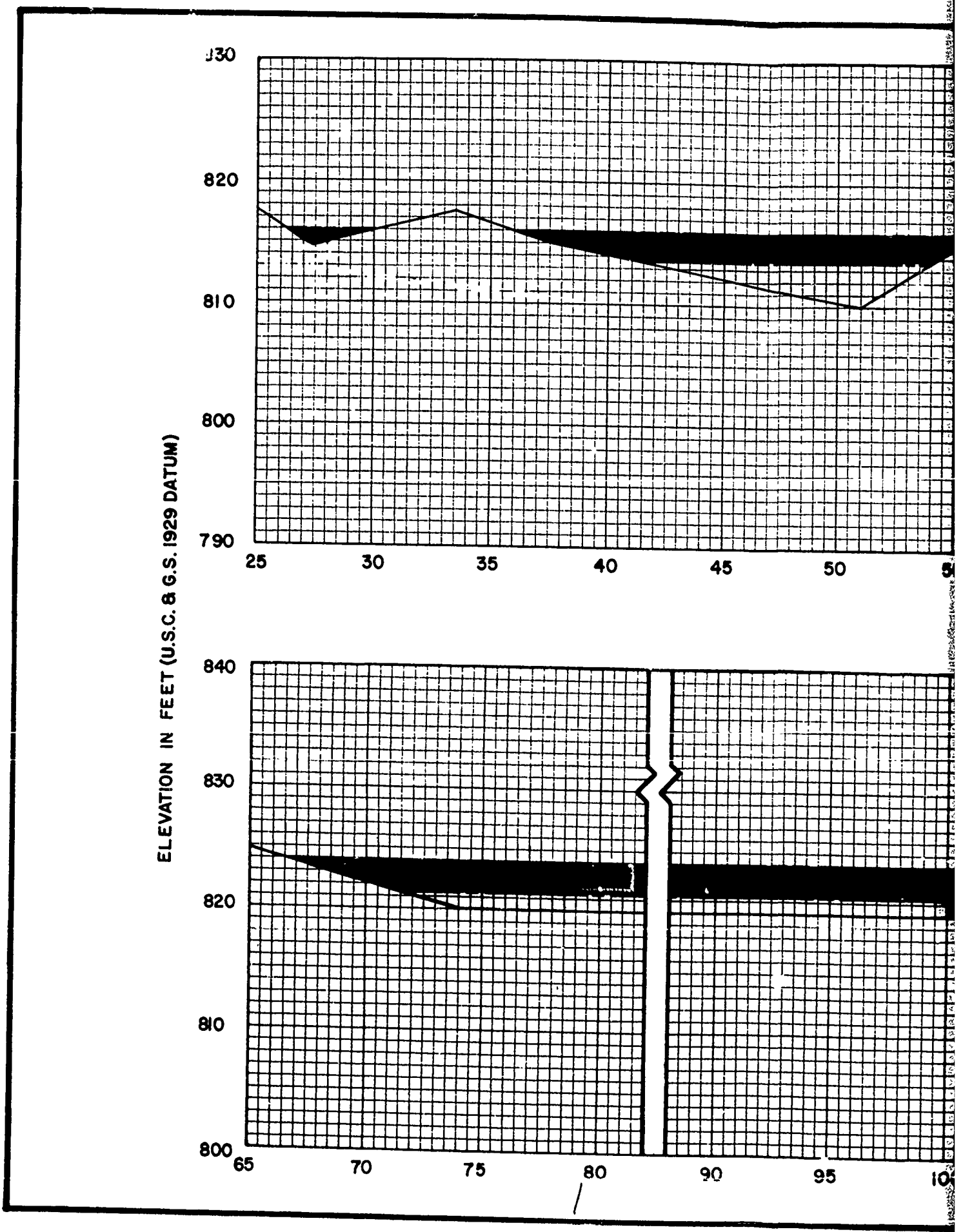
VALLEY CROSS SECTIONS ARE BASED ON ACTUAL FIELD SURVEYS, AND U.S. GEOLOGICAL QUADRANGLE MAPS

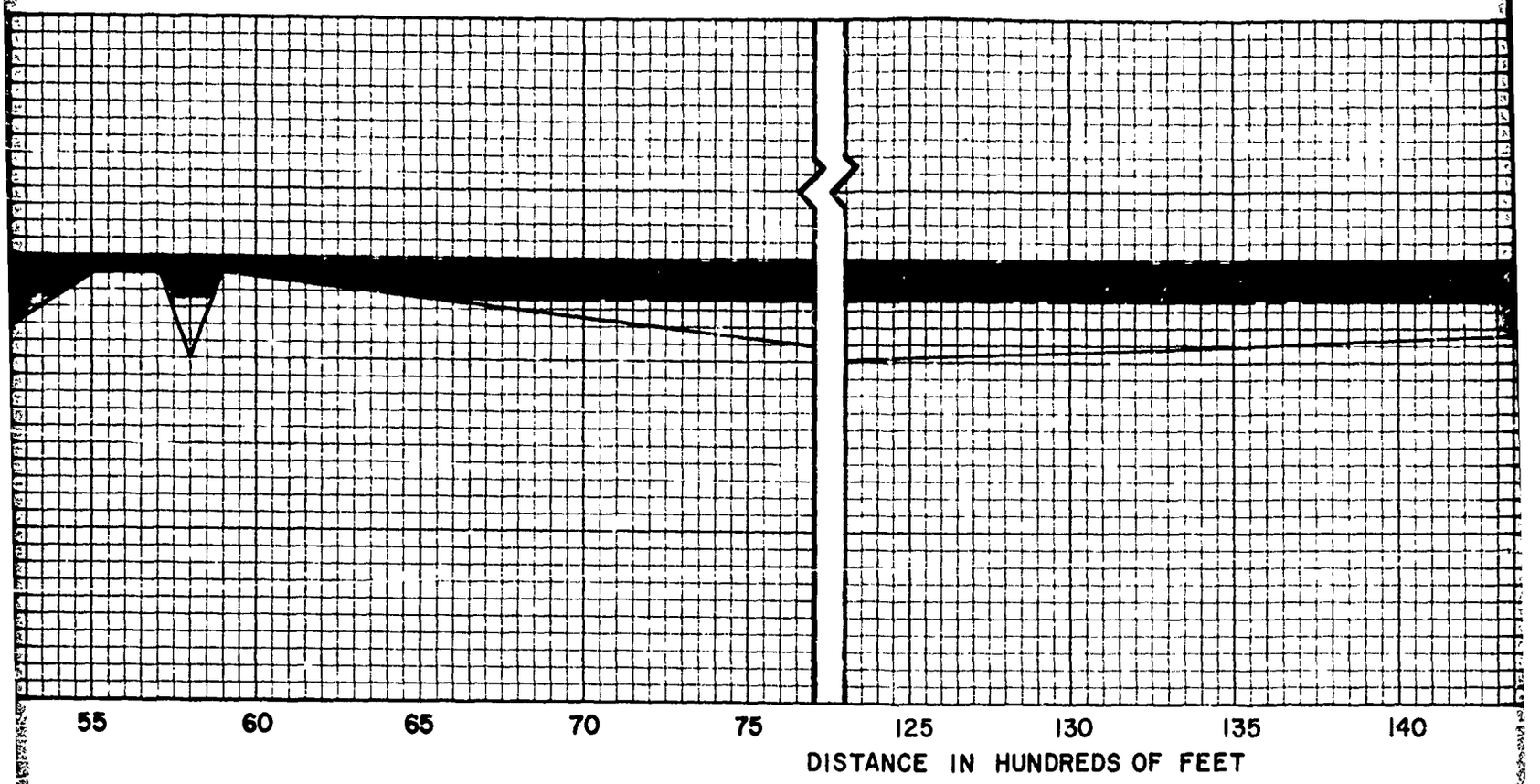
VALLEY CROSS SECTIONS ARE LOOKING DOWNSTREAM AND ARE LOCATED ON PLATES 3 AND 4.

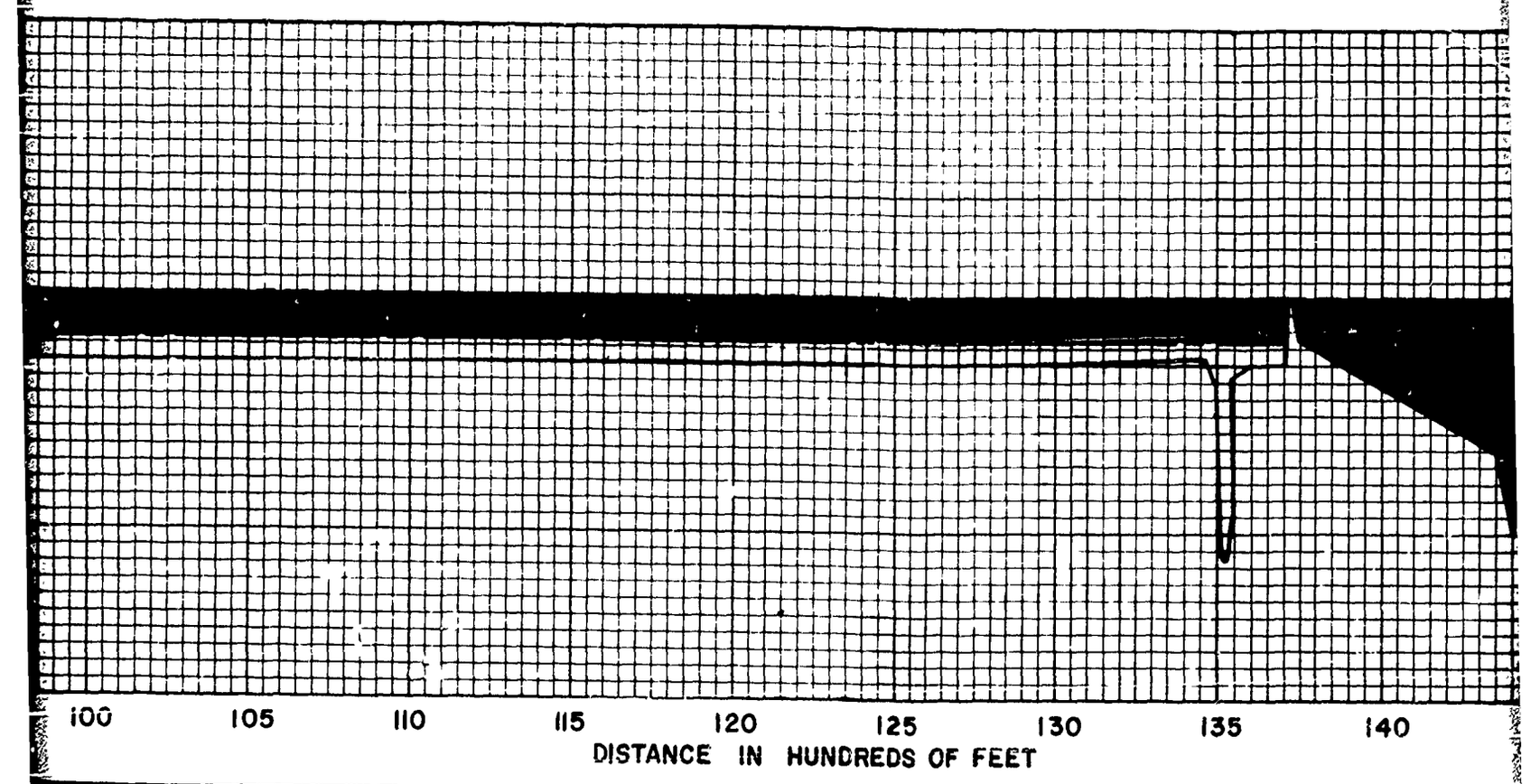
GRAND RIVER
TRUMBULL COUNTY, OHIO
FLOOD PLAIN INFORMATION REPORT
VALLEY CROSS SECTION
8 and 11

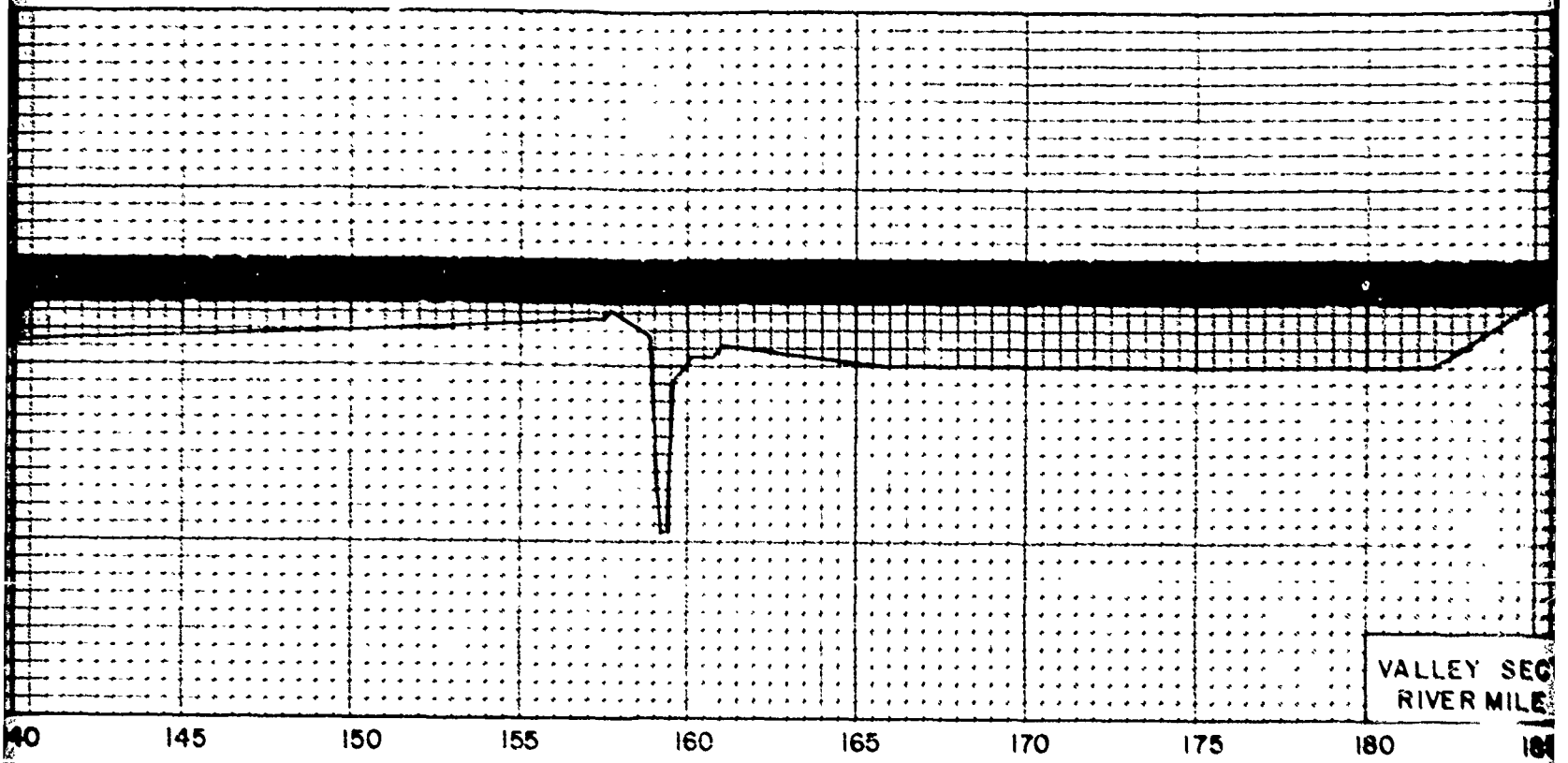
U.S. ARMY ENGINEER DISTRICT BUFFALO

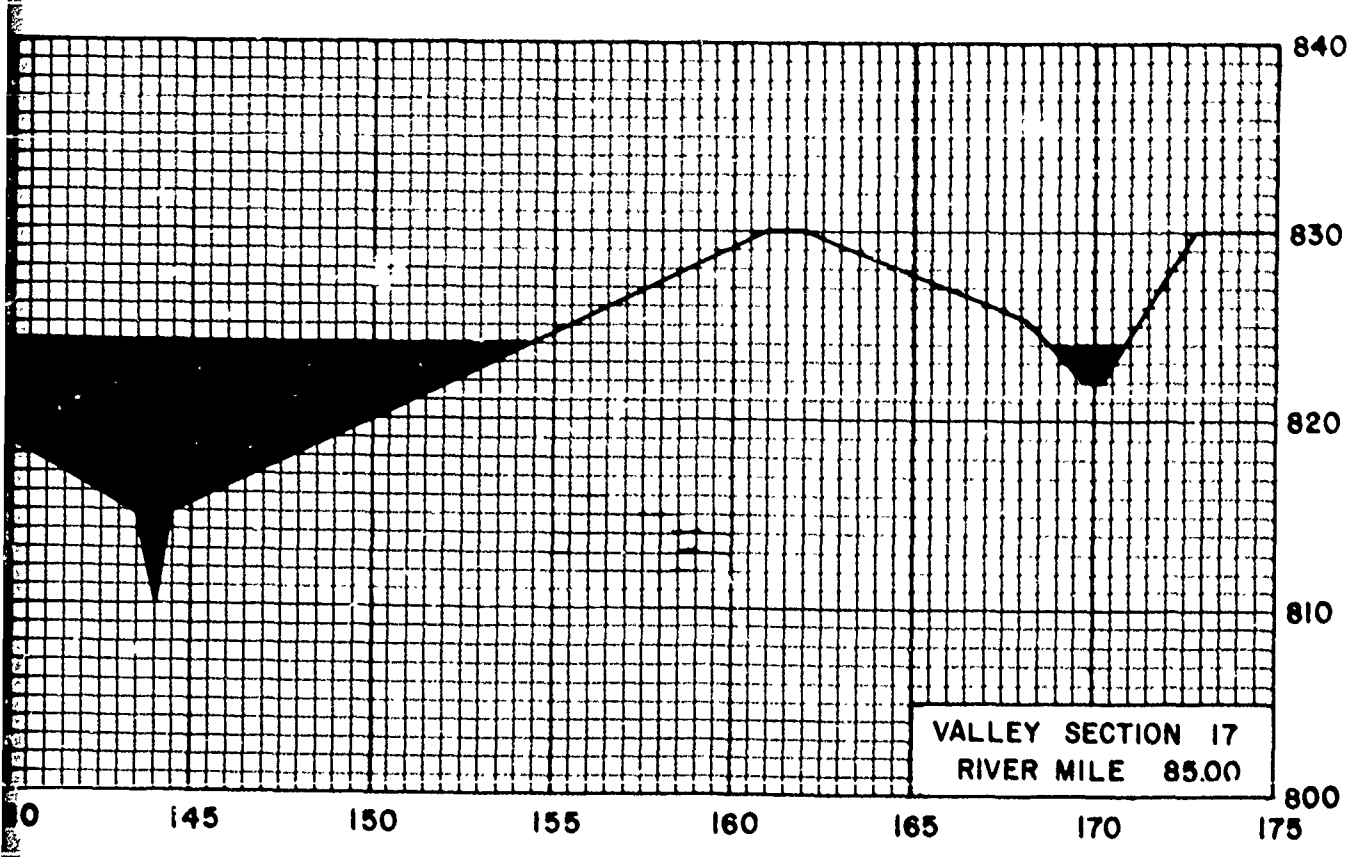
JULY 1975

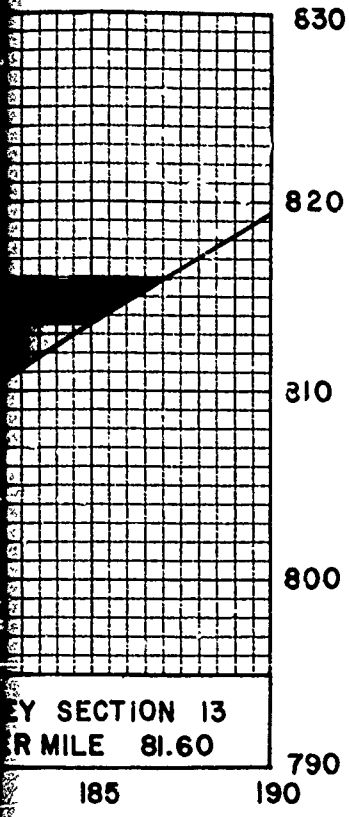

830
820
810
800
790
25
30
35
40
45
50
ELEVATION IN FEET (U.S.C. & G.S. 1929 DATUM)
840
830
820
810
800
65
70
75
80
90
95


55
60
65
70
75
125
130
135
140
DISTANCE IN HUNDREDS OF FEET


100
105
110
115
120
125
130
135
140
DISTANCE IN HUNDREDS OF FEET


VALLEY SEC
RIVER MILE
140
145
150
155
160
165
170
175
180


840
830
820
810
800
VALLEY SECTION 17
RIVER MILE 85.00
140
145
150
155
160
165
170
175



Y SECTION 13
R MILE 81.60

LEGEND

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

APPROXIMATE GROUND SURFACE

NOTES

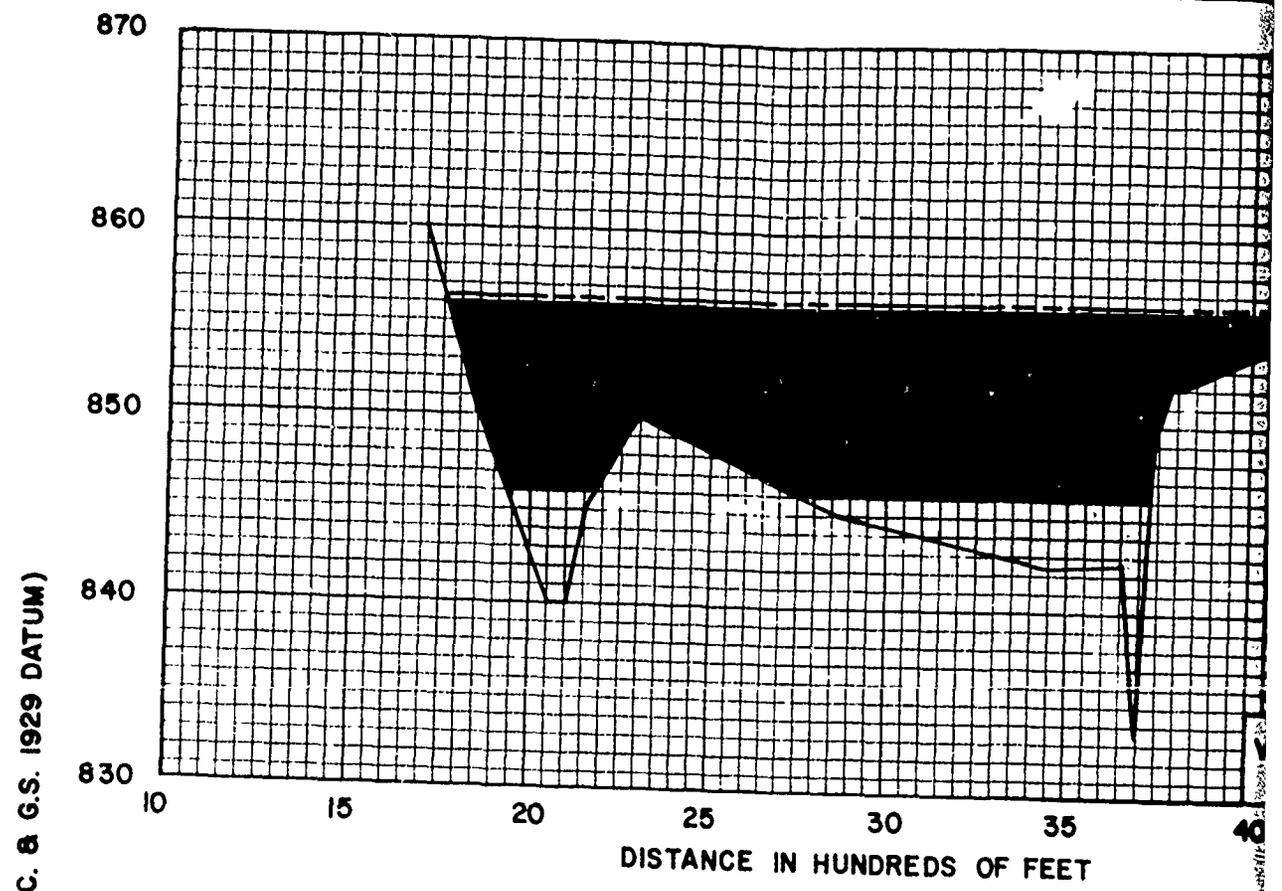
VALLEY CROSS SECTIONS ARE BASED ON ACTUAL FIELD SURVEYS, AND U.S. GEOLOGICAL QUADRANGLE MAPS

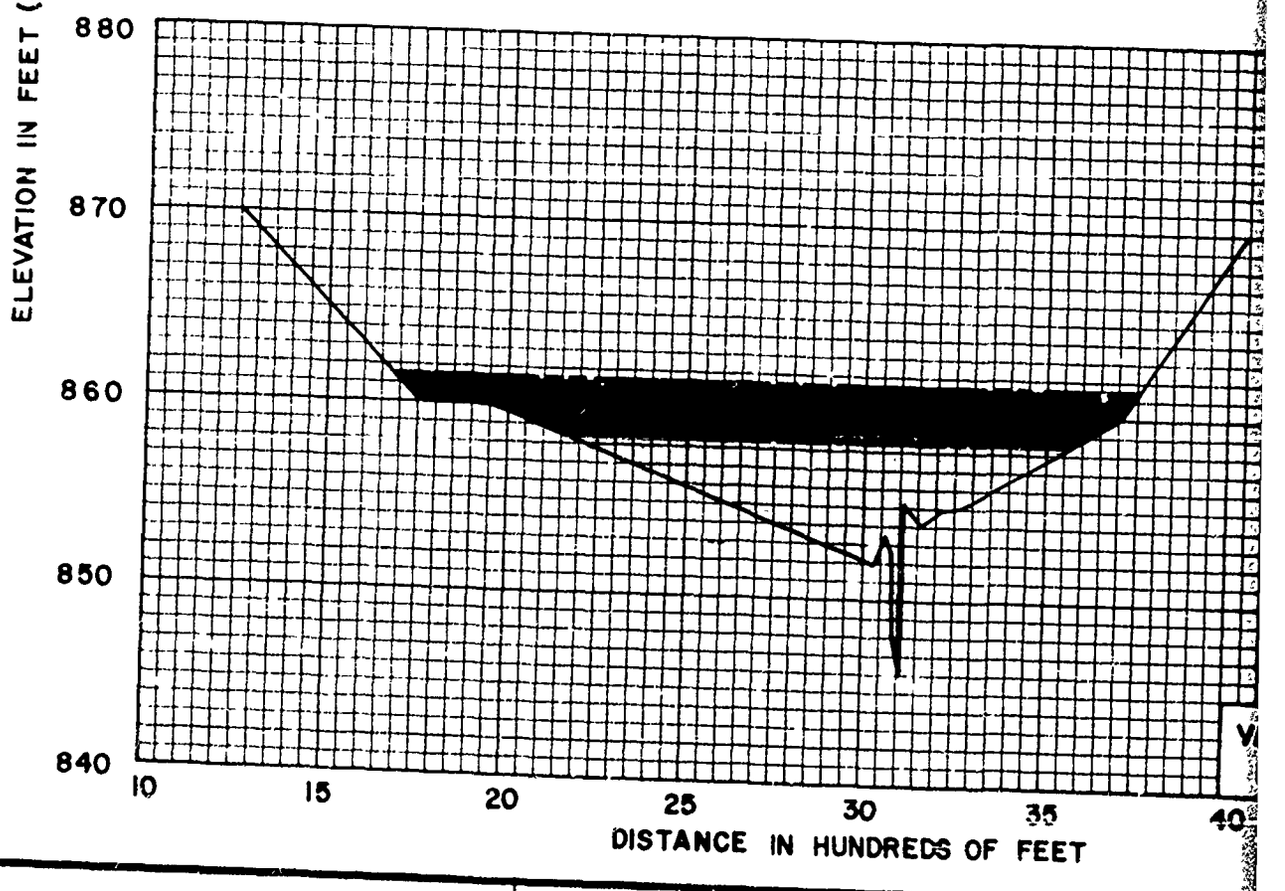
VALLEY CROSS SECTIONS ARE LOOKING DOWNSTREAM AND ARE LOCATED ON PLATES 5 AND 6.

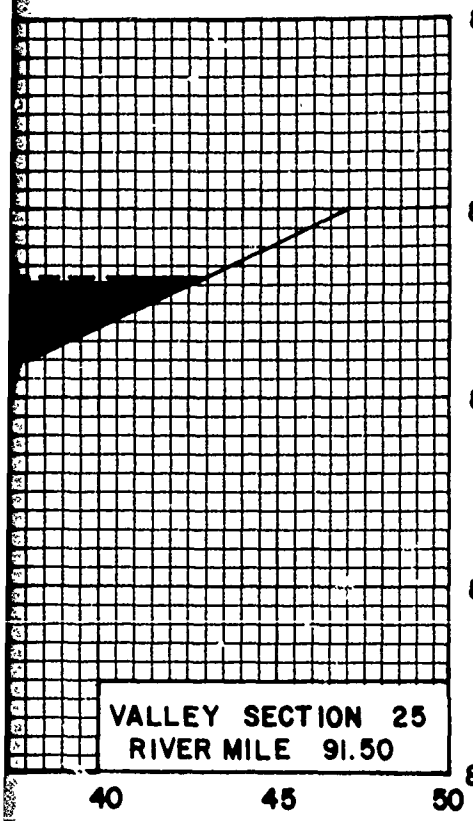
GRAND RIVER
TRUMBULL COUNTY, OHIO
FLOOD PLAIN INFORMATION REPORT
VALLEY CROSS SECTION
13 and 17

U.S. ARMY ENGINEER DISTRICT, BUFFALO
JULY 1975

PLATE 13


870
860
850
840
830
10
15
20
25
30
35
40
DISTANCE IN HUNDREDS OF FEET


ELEVATION IN FEET (U.S.C. & G.S. 1929 DATUM)
880
870
860
850
840
10
15
20
25
30
35
40
DISTANCE IN HUNDREDS OF FEET



LEGEND

STANDARD PROJECT FLOOD

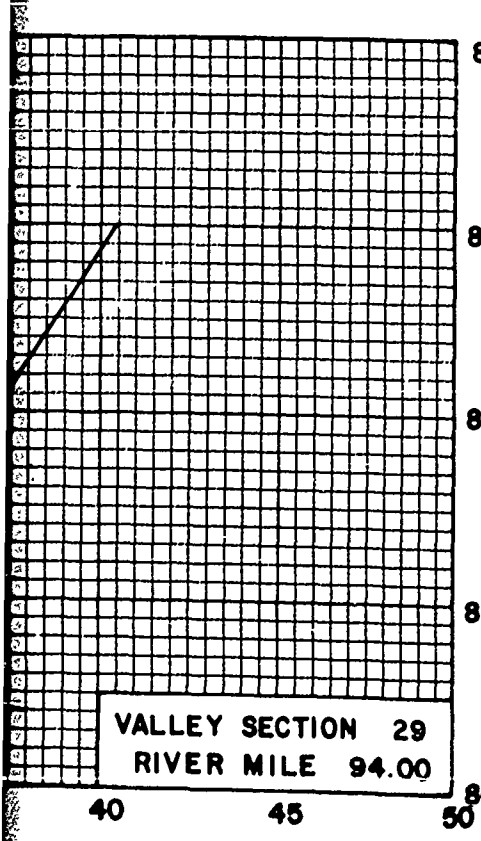
INTERMEDIATE REGIONAL FLOOD

APPROXIMATE GROUND SURFACE

NOTES

VALLEY CROSS SECTIONS ARE BASED ON ACTUAL FIELD SURVEYS, AND U.S GEOLOGICAL QUADRANGLE MAPS

VALLEY CROSS SECTIONS ARE LOOKING DOWNSTREAM AND ARE LOCATED ON PLATES 7 AND 8.



GRAND RIVER
TRUMBULL COUNTY, OHIO

FLOOD PLAIN INFORMATION REPORT

VALLEY CROSS SECTION
25 and 29

U.S. ARMY ENGINEER DISTRICT, BUFFALO

JULY 1975